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A Critical Investigation
INTO THE
THERMAL DEATH-POINT OF THE TUBERCLE BACILLUS IN MILK,
WITH SPECIAL REFERENCE TO ITS APPLICATION TO PRACTICAL PASTEURISATION.

BY F. W. CAMPBELL BROWN, M.D., CH.B. ABERD., D.P.H.,
LATE SENIOR ASSISTANT LECTURER AND CARNEGIE RESEARCH SCHOLAR, UNIVERSITY OF ABERDEEN.

THE thermal death-point of the tubercle bacillus in milk is a question to which many workers have given answers, but so discrepant have been the results that it would appear necessary that this work be revised and any possible previous sources of error eliminated by strict observance of care throughout the experiments. Further, it would appear necessary to have more definite results when one takes into consideration the prevalence of bovine tuberculosis among human beings at the present day—the majority of all such infections being transmitted by the milk of tuberculous cows. Milk-borne epidemics of typhoid, dysentery, &c., are not only historical facts, but also present-day occurrences, and neither the isolation of "carriers," nor the application of the most recent methods for early diagnosis of infectious disease amongst cows and milk workers will make the danger of milk-borne epidemics a thing unheard of. Considerations such as the above have led to the belief that a further attempt should be made to obtain information which would help to render such a universally used and essential food as milk a less dangerous article for consumption in human dietary.

Beneficial methods of treatment other than pasteurisation have been devised and used to render milk sterile. The addition of preservatives—e.g., boric acid, &c.—was sometimes used, but this is not a practice to be advocated. The quality of any such preventive required to destroy the tubercle bacillus in milk would be harmful to the tissues of the human body. Boiling the milk would in all probability destroy the tubercle bacillus, but in this case certain normal constituents of the milk are destroyed, and without these such milk becomes a much less valuable article of diet than in its fresh state. Electrical methods are being adopted in America and in Liverpool with some degree of success. This is an expensive method of treatment, and it has been shown that it is not any action peculiar to the electric current which sterilises the milk. Rather the action is due to the heat set up by the electricity as it flows through the apparatus.

The question of attacking the bovine tuberculosis in the human being at its source—i.e., in the cow—has been receiving much attention in recent years. The application of the tuberculin test, the better supervision of byres, and other factors which lead to healthy non-tuberculous herds, are all steps in the right direction; but to rid the country of all its tuberculous cattle is going to take a considerable time, and will require more stringent legislation than is at present in force. Even although tubercle-free herds have been installed throughout the country, pasteurisation will still remain as the best safeguard for getting rid of other contamination from sources other than the cow.

With these points in view, it will be necessary to consider the question of the thermal death-point of the tubercle bacillus from every possible angle to enable one to say that the pasteurisation process used is of decided value. The results obtained by previous workers must be noted and their methods carefully considered from the practical point of view.

PREVIOUS ATTEMPTS TO DETERMINE THE THERMAL DEATH-POINT OF TUBERCLE AND OTHER BACILLI.

At varying periods numerous workers have added their names to the now long list of investigators on this subject, giving, for the temperature factor 60° C., time factors varying from five minutes to eight hours as the necessary exposure of the bacilli to that degree of heat in order to destroy them. Many attempts have also been made to state a time factor when the temperature used was 70° C., but here, again, the results recorded are widely conflicting, varying from 1 to 45 minutes' exposure. Table A is a list (taken from Delépine's Food Report No. 79) of results obtained by various workers who used 60° C. and 70° C. as the temperature factors—the temperatures used also in the writer's experiments.

TABLE A.

Investigator.	Temperature used.	Time found necessary to kill the bacillus.
Yersin (1888)	60° C.	10 mins.
Bitter (1890)	,,	5 mins. sometimes enfeebles.
Bonloff (1892)	,,	20 mins.
Forster (1892)	,,	6 hours.
De Man (1893)	,,	1 hour.
Schraeder (1894)	,,	15 mins.
Woodhead (1895)	,,	(*a*) 8 hours (*b*) 45 mins.
Theobald Smith (1899)	,,	15–20 mins.
Russell and Hastings (1900)	,,	20 mins.
Hesse (1901)	,,	20 mins.
Rosenau (1907)	,,	20 mins
Delépine (1914)	64°–92° C.	Not killed in 39 mins.
Bang (1891)	70° C.	5 mins. only enfeebles.
Grancher and Lideux-Lebard (1892)	,,	1 min.
Woodhead (1895)	,,	(*a*) 45 mins. (*b*) 1½ mins.
Morgenroth (1900)	71° C.	10 mins.
Russell and Hastings (1900)		1 min.

POSSIBLE CAUSES OF VARYING RESULTS PREVIOUSLY RECORDED.

(*a*) The tubercle bacillus may vary in different cases in its resistance to heat; and in order to get over this difficulty, it is essential that as large a number of different strains as available be tested. Rosenau used five different strains in his experiments, whereas Delépine used milk infected by one animal to which cultures of another strain were added, thus having a mixture of only two strains.

(*b*) Variation of results may also be due to: (1) The fact that the only way to determine whether tubercle bacilli are alive or not after pasteurisation is by animal inoculation, necessitating much delay for obtaining results; (2) the difficulty in some cases in differentiating a lesion seen at post-mortem resulting from dead bacilli from that due to live bacilli; (3) the fact that somewhat similar post-mortem appearances are produced by pseudo-tuberculous lesions, caused by an entirely different organism. Only by searching for acid-fast bacilli can a differentiation be made in such cases.

(*c*) There is also the difficulty in obtaining standard and uniform dosage of bacilli for the animals—it being a well-known fact that the extent and rapidity of spread of the disease depend to some extent on the numbers of bacilli injected. Again, the period of time which elapsed before the animals were inoculated and examined may not have been uniform; and this is important, as Delépine points out that the disease produced by heated bacilli remained latent or occult for some four weeks in his set of experiments. Unless sufficient time elapses before the animals are examined, latent lesions may be missed. This point is brought out in Tables II. and III. of his report.

(*d*) The method of arriving at the exact temperature of the infected milk must essentially be taken into account. In all pasteurising plants the milk is *rapidly* raised to the desired temperature, the time taken being only a few seconds.

In the laboratory it is difficult to do this. The time required to raise the infected milk to the requisite temperature is much longer. The organisms are consequently being exposed to the slowly increasing temperature of the milk while the experimenter is

waiting for it to reach the desired 60° C. at which the exposure factor comes into play. I am of the opinion that, because the bacilli are being subjected to, say, 50° C. to 60° C. for a variable period, some may be killed, and all to an extent enfeebled, before the temperature of the milk reaches 60° C. In Rosenau's experiments, the bacilli were added to the cold milk and received a critical heat during the time the milk was being raised to 60° C. before the time factor was taken into account.

(*e*) Further, the method of maintaining a uniform temperature of 60° C. throughout the test, and recording the same, must be provided for. In both these points (*d*) and (*e*), Delépine's experiments cannot be truthfully compared with those of Rosenau's. The temperature used in Delépine's tests was a steadily rising one. On page 41 of his report, the words "the heating of milk from 12° to 78° in 29 minutes" do not agree with the figures given for time and temperature on page 6, and to which the paragraph on page 41 evidently refers. According to the figures on page 6, the time taken to raise the mixture from 12° to 78° was *19 minutes*. The milk remained at or above 60° for only seven minutes, when his sample (3) was taken at 78° and found to contain living bacilli. He also goes on to state in the same paragraph that after ten minutes more the sample (4) taken was found infective. The mixture had not 20 minutes' exposure to heat at or above 60° when this sample was taken, but only 18 minutes. He had no further sample taken for 72 minutes after this, and this was found sterile. His statement, therefore, cannot be correctly used to disprove Rosenau's belief—i.e., that tubercle bacilli are killed in 20 minutes at 60° C.

(*f*) Perhaps of all the possible causes for these varying results the most important is the container used, in which the test milk has been pasteurised; and it is only comparatively recently that more exact methods have been employed. It has been usual for the investigator to heat the infected milk in test-tubes, which were then immersed in a hot water-bath standing at a regulated temperature. With such a method there are two possible sources of error. Firstly, the test-tubes being open to the atmosphere, a surface scum forms on the milk. Bacilli find in this scum a certain degree of refuge from the heat, and a scum such as this will not maintain the same degree of heat as the deeper portions of milk, which will always be in circulation. Smith found that when no scum was allowed to form on the surface of the heated milk, as by heating it in closed vessels, tubercle bacilli were killed at 60° C. in 15 minutes, whereas when a pellicle was allowed to form these organisms survived for one hour at the same temperature. Secondly, there is the obvious danger of splashing the sides of the tube with live bacilli, which may quite easily contaminate the pipettes used for withdrawing later samples, when the bacilli withdrawn from the fully heated portion of the milk are by that time killed. And a further objection is that, by capillary attraction and by withdrawing sample after sample, a film of infected milk is left on the interior walls of the test-tube above the milk level. The inevitable result must be that numerous bacilli escape the full heat for a varying period, and tend slowly to fall by gravity into the bulk of milk, only to reinfect it after it might otherwise have been rendered sterile.

This appears to be the drawback to Rosenau's method, which was that described above. So also Twiss used an open flask when she carried out similar tests, using paratyphoid bacilli in her experiments. Her conclusion—i.e., that the results got by taking small amounts of test samples cannot be taken as proof that all the organisms are killed after periods of exposure used in practical pasteurisation—would appear to be due to the fact that a few organisms remain unexposed to the heat. These are not removed in the small amounts taken for inoculation of "sugars" or animals as the case may be. This vital point has been commented upon by Krumwiede and Noble, who repeated this work. These investigators made a distinct step forward when they adopted the plan of *totally immersing* the milk sample container in the water-bath, thus ensuring that all organisms present were exposed to the required degree of heat for the required period of time. In their experiments, measured quantities of sterile milk were placed in separate containers, submerged in a water-bath till the temperature of the milk reached 60° C. and then the emulsions of organisms were added. Each container with a rubber stopper was then *totally* immersed in the water, removed after a predetermined time, and immediately cooled.

This method undoubtedly has distinct advantages over the open test-tube method, but it is not free from comment. The technique is good, but requires finer detail in order to get absolutely correct and uniform results. First, there is no method of registering the temperature of the milk throughout the experiment. Krumwiede and Noble make no mention of having a thermometer inserted through the rubber cork of the containers. The necessity for this is borne out by the fact that, when I originally thought of employing similar methods in the following tests, I found that by inserting a thermometer through the stopper and placing the container on the bottom of the hot water oven and totally immersing it, the temperature of the fluid inside the container exceeded that of the water bath by 2·5-3° as a rule. On one occasion it was actually 10° warmer. It was not until after many attempts had been made to explain this anomaly that it was found to be due to the fact of the container resting on the metal bottom of the bath, which was warmer than the water. (The bath was heated from below by a gas jet.) On the other hand, if the container was *suspended* in the water and just clear of the bottom of the bath, the temperature inside the container coincided with that of the water in the water-bath. And, further, Krumwiede and Noble make no mention as to whether or not they provided for a lowering of the temperature of the milk standing at 60° C. when the emulsion of bacilli, presumably at room temperature, was added.

The necessity for guarding against this lowering of temperature was borne out by the writer adding 1 c.cm. of emulsion at 37° C. to 5 c.cm. milk standing at 60° C. The result was that the temperature of the milk emulsion at once dropped 7–8° C. And it was several minutes before the temperature of the infected milk rose to the figure (60° C.) at which the time factor comes into play. More especially is this to be considered when results are to be given in such short periods as minute intervals. It is, therefore, necessary before exact exposure periods can be obtained that certain preliminary adjustments be made to the apparatus and temperatures used before beginning any tests on the thermal death-point of any micro-organism. In my experiments such preliminary data were carefully prepared for use with a specially-made apparatus for subjecting infected milk to the degree of heat to be used. These, and the apparatus, will be later described in detail.

METHODS USED IN PERSONAL EXPERIMENTS.

The various cultures of tubercle bacilli used in the following experiments were obtained in the majority of cases from tuberculous ox glands, tuberculous milk, human tuberculous sputa, tuberculous joints and bones in man, &c. In addition, a few cultures were obtained from France, Germany, and the United States of America in order to ascertain whether a more resistant type of the tubercle bacillus existed in countries whence cattle are exported for use as human food in the United Kingdom. In all, 35 different sources were used for obtaining strains, some of which might possibly be more virulent or have a greater resistance to heat than the others. All those used were obtained since January, 1921, none being over eight months old, and the majority very much less.

Many weeks were spent in trying to isolate pure cultures from the tuberculous material obtained, and

it was not ascertained till numerous attempts had been made by the antiformin method advocated by Muir and Ritchie that the chlorine content of the antiformin varied with different supplies. It became evident that little or no success was likely to be obtained by this method, and the more recent technique, as used by Griffith, was employed, and with much greater success. In this method it matters little whether the chlorine content of the antiformin varies or not, as will be understood by the technique employed by the writer. In this case 10 per cent. antiformin solution was added to an equal volume of the sputa, &c. The mixture was rapidly shaken, and single loopfuls were sown on to culture medium after varying lengths of time—e.g., after exposures of 1, 3, 5, 10, 15 and 30 minutes. In this way a point is reached when all extraneous germs are killed, and only the more resistant tubercle bacilli remain alive. The most usual result found was that the culture tubes inoculated with tuberculous material exposed to the antiformin for less than five minutes were contaminated by the extraneous germs. On the other hand, pure growths of tubercle appeared in either the 5, 10, or 15 (more usually the latter two) culture tubes. Very rarely were any cultures obtained from the tubes inoculated with sputum which had been exposed to this percentage of antiformin for 30 minutes. With such a lengthy exposure the bacilli were evidently killed. In a few cases the bacilli withstood this length of exposure to 10 per cent. antiformin; this was possibly due to the sputum being thicker and more tenacious, as Griffith suggests. In the case of ox glands, shorter exposure of the caseous material was found to give the best growth on media. Such material would appear to protect the tubercle bacilli to a less extent than does tenacious sputum.

The only disadvantage in this method is the necessity of using six tubes of culture material for each attempt instead of one or two. The time used, however, is shorter than in the older method, where so much use of the centrifuge for washing out the alkaline antiformin after exposure to the tuberculous material is necessary. In order to utilise less culture medium small tubes were used for the primary growth, and from the one containing the pure growth subcultures were sown on large tubes in order to obtain sufficiently abundant growths to perform the further experiments.

The culture media used for obtaining growths were either the egg medium advocated by Dorset, or a modification of the same. In some cases Petroff's medium was employed for the original attempts, where pure growths were difficult to obtain, but it appeared that the gentian violet as used somewhat tended to inhibit the tubercle bacilli as well as the contaminating organisms. The best results, especially when the method of sowing as used by Griffith was adopted, were obtained by using ordinary egg medium with sufficient quantity of basic fuchsin added to colour the medium dark pink, as suggested by Cruickshank. By using such a medium the cream-coloured early growth was more readily recognised than when no fuchsin was added. The addition of the fuchsin did not appear in any way to inhibit the growth, which could be observed even in seven days in most cases.

Glycerine was added according to whether the particular strain being isolated was from a human or bovine source, and it must be said that although in more recent views it is held that this substance cannot be relied upon to differentiate between the human and bovine types of this bacillus, the bovine strains did not grow at all, or at any rate only grew very slowly, on glycerine egg. Although this fact was noted, this method was not used for differentiating the various strains used in this series of investigations. After several months, during which nothing was done beyond experimenting with different media and obtaining a sufficient quantity of pure cultures, the total number of cultures exceeded 250 in number. This stock consisted of 35 strains obtained from different sources.

PREPARATION OF INFECTED MILK FOR PASTEURISATION EXPERIMENTS.

An emulsion of 0·2 g. dried bacilli and 1 c.cm. sterile milk was added to 5 c.cm. milk at a temperature of 67° C. in a specially designed flask. The flask was devised so that a thermometer could be kept in its interior. It had also a thin limb with a stopcock at the extremity for withdrawing samples of milk by means of a pipette at various stages of the experiments. The entire apparatus was kept completely submerged in a water-bath standing at 60° C., and only the stop-cock withdrawn momentarily when a sample was required. The effect of adding 1 c.cm. emulsion at room temperature was to lower that of the 5 c.cm. from 67° to 60° C. immediately, thereby enabling the experiment to be commenced at the temperature desired for the duration of the test. This precaution seems to have been overlooked by numerous workers, and would appear to be necessary, especially when the more delicate organisms are being dealt with. The samples withdrawn were of uniform quantity, quickly cooled to 30° C., and then inoculated into guinea-pigs, each pig receiving 0·02 g. tubercle bacilli in 1 c.cm. milk. Heavy infection was aimed at to ensure quick and decisive results.

In all, 25 strains of tubercle bacilli were tested in this manner, ten samples being taken at varying exposure times, and an unheated sample inoculated as a control for each strain. In order to ascertain whether or not all the bacilli were killed and none remained unexposed (in the apparatus) to the heat, organisms giving more rapid reactions than tubercle bacilli were used. That no live bacilli had escaped inclusion in the samples was proved by inoculating the whole flask and its remaining contents in suitable culture media.

INOCULATION OF TEST ANIMALS.

The guinea-pigs were inoculated at the flexure of the thigh, and each series was isolated from those used for the different experiments. No animal was killed before the tenth week after inoculation, in order to allow time for latent disease to become manifest, and in cases of doubt reinoculation with the doubtful lesions were made. The presence of the disease in the positive animals was in most cases quite definite, being made manifest by abscess-formation at the site of inoculation, enlargement of lymphatic glands, presence of tubercles or necrotic areas in the liver, spleen, lungs, &c.

RESULTS OBTAINED.

These are given in detail in the tables, which contain only a summary of the results obtained, and do not convey to the reader any idea of the vast amount of time and work spent in carrying out these experiments. The animals used, including those required for reinoculations, exceeded 280 in number; and the time taken in carrying out this part of the tests alone—i.e., in inoculating, supervising, and performing autopsies on them—extended over six months.

Tables I. and II. give all the results obtained with 15 bovine strains, using 60° C. as the temperature factor. It will be noted that in the great majority of cases ten minutes' exposure to this degree of heat is not sufficient to prevent the bacilli from causing tuberculosis in the guinea-pig, while even 15 minutes is not sufficient in some cases. However, a period of 20 minutes was found either to kill the bacilli or so to enfeeble them that the protective forces in the guinea-pig were able to prevent the latter from becoming tuberculous. Three strains, Nos. 3, 7, and 12, gave rather doubtful results after 20 minutes' exposure, but on reinoculation with the doubtful lesions no tuberculosis developed in any of the animals used. It was unfortunate that the control animal for strain No. 13 died accidentally, but the fact that the animals given this strain heated for 10 and 15 minutes developed tuberculosis proves that

the strain was a virulent one, and it has therefore been included with the others in Table I.

TABLE I. (BOVINE STRAINS).—*Infected Milk subjected to 60° C. for Varying Exposures as stated below.*

Strain	C	Time of exposure at 60° C. (in min.)					Strain	C	Time of exposure at 60° C. (in min.)				
		10	15	20	25	30			10	15	20	25	30
1	+	+	−	−	−	−	9	+	−	−	−	−	−
2	+	+	−	−	−	−	10	+	−	−	−	−	−
3	+	+	+	−?	−	−	11	+	+	+	−	−	−
4	+	−	−	−	−	−	12	+	+	−	−?	−	−
5	+	+	−	−	−	−	13	+	+	+	−	−	−
6	+	−	−	−	−	−	14	+	−	−	−	−	−
7	+	+	−?	−?	−	−	15	+	+	−	−	−	−
8	+	+	+	−	−	−							

C, Control animal. +, Tuberculosis found at autopsy. −, No tuberculosis found at autopsy.

Result.—All rendered non-lethal at or before 20 minutes' exposure to 60° C. Refer to Table II. for doubtful cases.

TABLE II.—*Confirmation Tests from Doubtful Lesions of Guinea-pigs in Table I.*

Strain.	Lesion from animal treated with milk at 60° C. for :—	Guinea-pig.	Guinea-pig.
3	20 minutes	−	−
7	15 ,,	−	−
7	20 ,,	−	−
12	20 ,,	−	−

Result.—Doubtful lesions as recorded in Table I. were found to be caused not by living but possibly by dead bacilli.

TABLE III. (BOVINE STRAINS).—*Infected Milk subjected to 70° C. for Varying Exposures as stated.*

Strain	C	Time of exposure at 70° C. (in min.)					Strain	C	Time of exposure to 70° C. (in min.)				
		1	3	5	10	15			1	3	5	10	15
1	+	+	+	−	−	−	9	+	−	−	−	−	−
2	+	−	−	−	−	−	10	+	+	−	−	−	−
3	+	+	−	−	−	−	11	+	+	−	−	−	−
4	+	+	−	−	−	−	12	+	+	+	−	−	−
5	+	+	−	−	−	−	13	+	+	+	−	−	−
6	+	−	−	−			14	+	+	−	−	−	−
7	+	+	+	−	−	−	15	+	−	−	−	−	−
8	+	−	−	−	−	−							

Result.—No virulent bacilli were found after 5 minutes' exposure to 70° C.

Table III. gives the results when the infected milk was heated at 70° C., using the same 15 strains of bovine tubercle bacilli. In this case no tuberculous lesions developed in any of the animals inoculated with infected milk which had been exposed to a temperature of 70° C. for five minutes. While the essential object of these tests is to determine the thermal death-point of the bovine type—the type which is most likely to be found in cow's milk—yet it should be borne in mind that there is always the possibility of contamination of milk by the human type of the bacillus. Contamination with the latter may occur from tuberculous dairymen. It is important, therefore, that the thermal death-point of the human type also be ascertained. For this purpose ten human strains were tested, and the results obtained are given in Tables IV. and V. It will be observed that there would appear to be little or no difference in the thermal death-point between the bovine and human types of this organism.

I believe that, when tuberculous milk is *heated either at 60° C. for 20 minutes or at 70° C. for 5 minutes, it can safely be assumed that the bacilli are killed.* If they are not actually killed, they are so enfeebled that the normal powers of resistance of the guinea-pig find the former an easy prey, and no tuberculosis develops. This statement can in all probability be applied to man. More especially is this the case when it is not to be expected that the milk he drinks would ever contain such numbers of bacilli as have been given

TABLE IV. (HUMAN STRAINS).—*Milk Infected when at 67° C. and Mixture kept at 60° C. throughout Exposure Periods.*

Strain	C	Time of exposure to 60° C. (in min.)					Strain	C	Time of exposure to 60° C. (in min.)				
		10	15	20	25	30			10	15	20	25	30
1	+	+	−	−	−	−	6	+	+	−	−	−	−
2	+	−	−	−	−	−	7	+	+	−	−	−	−
3	+	+	−	−	−	−	8	+	+	+	−	−	−
4	+	−	−	−	−	−	9	+	−?	+	−?	−	−
5	+	−	−	−	−	−	10	+	+	−	−	−	−

Result.—In all cases an exposure of 20 minutes at 60° C. was sufficient to render the bacilli non-virulent. Reinoculation of doubtful results got with No. 9 proved negative.

TABLE V. (HUMAN STRAINS).—*Milk Infected when at 77° C. and Mixture then kept at 70° C. throughout Experiment.*

Strain	C	Time of exposure to 70° C. (in min.)					Strain	C	Time of exposure to 70° C. (in min.)				
		1	3	5	10	15			1	3	5	10	15
1	+	−	−	−	−	−	6	+	+	−	−	−	−
2	+	−	−	−	−	−	7	+	+	−	−	−	−
3	+	−	−	−	−	−	8	+	−	−	−	−	−
4	+	+	+	−	−	−	9	+	+	+	−	−	−
5	+	+	−	−	−	−	10	+	−	−	−	−	−

Result.—No virulent bacilli remained after 5 minutes' exposure to 70° C.

to the guinea-pigs, each guinea-pig receiving 0·02 g. of pure culture as a dose. Therefore, *tuberculous infection* from milk treated with either of these two combinations of temperature and time factors may be entirely disregarded from an administrative public health point of view.

But because either method of treatment will render milk free from infection, the effect of heat on the other constituents of the milk must not be disregarded; and it is now necessary to consider if both methods of treatment may produce equally good effects, or if there are sufficient grounds for preferring one as opposed to the other.

There is evidence to show that the organisms producing lactic acid in milk prevent the development of spore-forming organisms of the putrefactive group. Therefore, the presence of the former in the treated milk is an advantage. Further, the effect of prolonged exposure to temperature exceeding 65° C. has been shown to destroy valuable enzymes in the milk; and also the fat globules may be broken up, and the "cream line" lost.

The question of the effect of heat on enzymes in milk has been studied by many workers, and the results obtained are given by Race. His results show that exposure to temperatures of 65° C. and under for a period of 30 minutes has no effect on the enzymes found in fresh milk. Numerous workers quote figures dealing with this question, but the most recent and probably the most accurate authority on the subject is McCollum, who has done so much valuable recent work on the nutritional value of various foodstuffs. The work of Hess and of McCollum together indicate that the effect of different degrees of heat on the nutritional value of milk is extremely important in the consideration of scurvy in infants.

Scurvy is considered by these workers as of bacterial origin, but the reasons cannot be gone into here. Sufficient it is to quote the conclusions come to by them. These are that milk heated to 74° C. for 30 minutes is more liable to cause scurvy than milk which has been pasteurised at 63° C., or boiled. The explanation given is that at 74° C. nearly all the lactic acid-forming bacilli are killed, and so the spore-forming bacilli alone remain, and in time bring about putrefactive decomposition. Further evidence is given to show that stale pasteurised milk augments the danger of development of scurvy in infants.

They further add that pasteurisation in itself does not seem to have any influence in lowering the nutritive

value of milk, but that pasteurisation should be carried out at the lowest temperature which will destroy the action of pathogenic organisms, and the milk consumed soon after treatment.

With these facts in view it would, therefore, appear that the "flash" system as carried out in the majority of dairies in this country is inferior to the "holding" system, for the following reasons:—

(1) Exposure to 70° C. for a mere matter of a few seconds does not destroy the action of the tubercle bacillus.

(2) By killing the harmless lactic acid-forming bacilli, the harmful putrefactive organisms are more readily allowed to develop; and further—

(3) The fact that souring is prevented allows the milk to remain "sweet" to the housewife, whereas if "sour" it would not be used (vide ante—Scurvy).

(4) The possibility of the lactose becoming scorched, the casein hardened, and the calcium, magnesium, and phosphoric salts precipitated, and also the commercial objection—viz., the "cream line" being interfered with.

As the "holding" system, using a temperature of 60° C. and holding the milk thereat for at least 20 minutes, seems to have all the advantages and none of the disadvantages of the "flash" system, it is to be preferred.

CONCLUSIONS.

1. It has been shown that by using 25 strains of the tubercle bacillus no wide difference in the thermal death-point is found.

2. The thermal death-point of this organism is practically similar for human and bovine types.

3. The previous wide variations in results have been due to too little care in carrying out the experiments, and to the fact that the lesions caused in test animals had not previously always been given sufficient time to develop and be accurately diagnosed.

4. If a temperature of 60° C. be used, it requires 20 minutes' exposure to this degree of heat to prevent milk so treated carrying infection to the guinea-pig.

5. If a temperature of 70° C. be used, it requires five minutes' exposure to ensure the same results.

6. Of these two combinations of time and temperature factors, the former excels the latter, when the *food value* of the treated milk is also considered.

7. The writer is of opinion that, until bovine tuberculosis can be stamped out at its source—namely, in the ox—proper pasteurisation of milk is the only safe method of rendering milk safe as a diet for human consumption.

Note.—Since the completion of these results in 1922 it is interesting to note that, by the passing of the Milk and Dairies (Amendment) Act, 1922, and the issue of the Milk (Special Designations) Order, 1922, made by the Minister of Health under Section 3 of the said Act, *legislation now exists* whereby until July 1st, 1923, any process of pasteurisation (including the "flash" process) capable of effecting the necessary reduction of bacteria was permitted. Subsequent to that date suppliers of pasteurised milk must conform to certain conditions if the milk is to be sold as pasteurised milk. One of these conditions compares favourably with my results—namely, that the milk must be retained at a temperature of not less than 145° F. (approx. 63° C.) and not more than 150° F. (approx. 66° C.) for at least 30 minutes; also that no other treatment of heat may be adopted. These limits of temperature and duration of exposure give a safe margin as far as ensuring the destruction of any tubercle bacilli in milk thus treated.

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ANTE-NATAL DIAGNOSIS.*

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THIS is a large subject, and I propose dealing with it strictly from the clinical point of view, laying stress on the methods by which a diagnosis is come to. With it is very closely associated the actual diagnosis of pregnancy itself. Success in diagnosis is based on a routine method of examination, and the recognition of abnormal conditions on a wide experience of the normal.

The patient should always be prepared by emptying the rectum and bladder. The latter can be a particular source of trouble. Conditions which hinder diagnosis are nervousness on the part of the patient, difficulty in adopting the abdominal type of breathing, stoutness, and unduly developed musculature of the abdominal wall. The results of nervousness can usually be obviated by paying attention to the history and by examining other parts, such as the breasts, before beginning to palpate the abdomen. None of the manipulations involved in making a complete diagnosis should hurt a normal patient. Gentleness and patience are repaid many times over by the results obtained.

Early Stages of Pregnancy.

The diagnosis of pregnancy is usually possible from the end of the second month. In the history, points of value are amenorrhœa, a history of morning sickness, and pain and tenderness of the breasts. On examination at from eight to ten weeks the breasts rarely show anything of diagnostic value. On abdominal palpation one is usually conscious of some resistance above the symphysis pubis. Vaginal examination shows that there is some softening of the cervix, and that the body of the uterus is enlarged, softened, and rounded. I do not lay much stress on Hegar's sign, which can only be obtained if the abdominal wall is very lax. The increased width of the uterus is a useful aid to diagnosis, particularly as it can be estimated by the vaginal fingers alone where, for one reason or another, bimanual examination is difficult. Thus it is particularly useful in cases of retroflexion. The fornices should be palpated for any abnormality.

Patients rarely pay a visit at this stage of pregnancy, except for confirmation of its existence or for a diagnosis, where the history is unusual. Yet a visit at this time is important ante-natally, for many miscarriages result from retroflexion of the uterus, and at this stage a mobile retroflexion can readily be put right, either by postural exercises or, in severer cases, by the use of a watch-spring pessary.

Twentieth to Twenty-second Weeks.

A stage at which many patients pay a first visit is about the twentieth to the twenty-second week of pregnancy. To the history of amenorrhœa are now added the facts of "quickening" and swelling of the lower abdomen. As regards "quickening," it is usually stated that it occurs between the eighteenth and twentieth weeks of pregnancy, but many patients say that they are conscious of fœtal movement considerably earlier than this. On the other hand, movements of flatus in the intestine can be mistaken for fœtal movement; patients who have already had several children come for confirmation of the presence of pregnancy, complaining of fœtal movement, when they are not pregnant at all.

On examination at 20 to 22 weeks the breast signs are of great importance in primigravidæ. Occasionally they are not conspicuous. The linea nigra shows in the lower abdomen and a definite median swelling is seen and felt there. External ballottement shows the presence of fœtal parts, and the fœtal heart is some-

* A paper read at a meeting of the London Association of the Medical Women's Federation.

times heard with surprising distinctness. Even if the fœtal heart is not heard, fœtal movements can frequently be heard as well as other signs of activity, such as the uterine souffle. At this stage vaginal examination confirms the diagnosis, but is not always necessary for this purpose. There is early congestion of the vaginal mucosa, softening is marked, and the swelling in the abdomen can be proved bimanually to be the uterus. Internal ballottement can be produced in the anterior fornix.

Pelvimetry.

Varying with the circumstances of the case, I always consider the size and shape of the pelvis at this, or at an earlier visit, as a guide for the future of the case. It is important to note the stature of the patient. When she lies on her back on the couch, one considers her general outline. A useful "grip" is made by resting the ball of either thumb on the anterior superior spine of the pelvic crest, and clasping the crest in one's hands (Fig. 1). This gives information as to the general size and symmetry of the pelvis; it shows whether the intercristal measurement is greater than the interspinous, and indicates the antero-posterior measurement of the pelvis. One then takes the ordinary measurements, the interspinous, intercristal, and external conjugate.

Internally, I examine the capacity of the pelvis with the patient in Sims's position, judging the width of the pubic arch, sweeping round either side of the pelvis for any abnormality and reaching up towards the promontory. It is difficult to be sure of the promontory unless one can reach slightly beyond it to the beginning of the lumbar curve, and this is only possible when there is contraction of the diagonal conjugate. The resistance of the perineum may play an important part in preventing one from reaching the promontory. Pelvimetry, especially in its wide sense of judgment of the size and shape of the pelvis, is of great importance to the examiner as a guide, but except in extreme cases the crux of the case comes later in the judgment as to whether the particular head in question will pass through the pelvis or not.

First and Second Pelvic Grips.

At 34 to 36 weeks complete ante-natal diagnosis is possible, and I propose going rather fully into the description of a method by which I find students and nurses soon learn to build up a sound diagnosis for themselves.

With the patient's date in mind, first note the general size, shape, and prominence of the abdomen, and also the height of the fundus uteri. The first pelvic (Pawlik's) grip is then made. For this the patient lies extended, breathing freely, and the examiner faces her. The hand is laid above the symphysis, taking the widest possible grip, and as the patient expires each time it is sunk a little deeper into the abdomen (Fig. 2). In favourable cases the hand now finds itself gripping the fœtal head, and it can be determined right away whether this is movable or fixed in the pelvis, and, by manipulating the hand slightly, whether flexion is present. Thus, by this grip alone a complete diagnosis of the lie of the fœtus may be made, and the remaining grips are only confirmatory. If the head is not felt by this grip and the succeeding one, it must be sought elsewhere before an attempt is made to discover other parts of the fœtus.

The second pelvic grip is now taken, facing the patient's feet, with her thighs and knees slightly flexed to relax the abdominal muscles. Again, a wide grip is taken, capable of enclosing the whole head, and the finger tips are sunk downwards and backwards, again with each expiration, until the presenting part is felt between the hands (Fig. 3). This grip is perhaps even more useful than the first, and in most cases confirms it. A head that appeared fixed sometimes shows itself somewhat movable, when the muscular tension is relieved, and occasionally the flexion of the head is found to be towards the opposite side from that expected. This is because the Pawlik grip does not always admit of the palpation of that part of the head which lies posteriorly.

Fundal Grip, &c.

The fundal grip is now practised and is of particular importance when the head has not been found at the pelvic brim, when there is uncertainty as to whether the presenting part is the head or not, or when multiple pregnancy is suspected. It is most important to find the head before proceeding further with the diagnosis. If the head is at the fundus its main bulk rests to one side or other of the middle line and two grips are taken accordingly, the hands being placed sufficiently widely apart to allow of the enclosure of the whole head (Fig. 4). I impress the importance of width of grip because I find that beginners rarely make it wide enough. The deciding points about the head are its firmness and roundness, the fact that it ballottes between the examining hands, and that it is divided from the rest of the body by a definite gap. Ballottement of the head at the fundus can also be obtained by laying one hand over the prominence produced by it and shaking it within the convexity of the hand. The breech never moves sufficiently to give this result.

To decide where the fœtal back lies, a useful grip is one by which the resistance of the two sides of the lower abdomen is compared. The fingers of one hand are spread between the anterior superior spine and the umbilicus and sunk deeply into the abdomen (Fig. 5). The same hand is used in exactly the same way on the other side. This shows at once whether the back is anterior or not, and by the definite resistance of one side on which side it is. Confirmation is obtained by holding the uterus in position with one hand while palpating with the other, and vice versa. The fœtal heart is now sought according to the diagnosis made and used as a confirmatory sign of diagnosis.

Engagement of the Head in the Pelvis.

It used to be taught that in primigravidæ the head did not begin to engage until the thirty-sixth week of pregnancy, and then gradually sank down into the pelvis, and that in multigravidæ engagement did not occur until labour began or shortly before this. We must consider what produces engagement of the head and what determines a difference between primi- and multigravidæ.

As pregnancy advances stretching of the uterine and abdominal walls increases, and, given a normal pelvis and fœtal head, the tension produced thereby overcomes the resistance offered by the pelvis and the structures in it, and the presenting part engages in the pelvis. The tension is greater in primigravidæ because neither the uterus nor the abdominal wall has been stretched before; hence the fœtal head usually engages early, but in multigravidæ with well-preserved musculature engagement occurs also. Usually engagement has begun at 34 weeks. Occasionally we find a head quite deep in the pelvis at 28 to 30 weeks. If the head has not engaged, or does not show signs of engaging, by 36 weeks in a primigravida the reason must be carefully sought. If the pelvis is small or asymmetrical the fact is already known. The head may be large or in a bad position; a loaded rectum will push the head out of the pelvis, and a low-lying placenta acts in the same way. The grip I now use to the exclusion of others to determine whether a head is likely to go through a given pelvis or not, is one by which I press down the fœtus towards the pelvic brim from the fundus, when the abdomen is lax, and lay the other hand flat just above the symphysis (Fig. 6). Having made a careful diagnosis of the presentation and position of the head previously, I then judge by the amount of overlapping present.

Maturity of the Fœtus.

It is important to be able to give a sound opinion on the maturity of the fœtus for two reasons: first, to be able to give advice to those who require it, as, for instance, to a mother who has conceived during the amenorrhœa of lactation; and, secondly, to determine whether the patient's dates are reliable. The question of maturity can be decided only as a judgment on the average find, since normal full-term infants vary so considerably in size, and such signs as deep engagement

of the head may be altogether misleading. First note the height of the fundus uteri and the general size of the abdominal swelling; then, if the fœtus is sufficiently mature, note the size of the head and its position as regards the pelvis—whether floating above the brim, engaging at the brim, or deep in the pelvis.

Until the uterus reaches the umbilical level at about 22 weeks the height of the fundus is a fairly good guide; after this all the points above must be taken into consideration together. I rely most on the size of the fœtal head, and, gripping this with one hand and the breech with the other, consider the size of the child. It is well in multigravidæ to find out the weight of former children at birth.

FIG. 1.

Ball of either thumb on anterior superior spine of pelvic crest, the crests being clasped in the hands.

FIG. 2.

First pelvic (Pawlik's) grip; hand above symphysis pubis, as widely extended as possible, to grip the fœtal head.

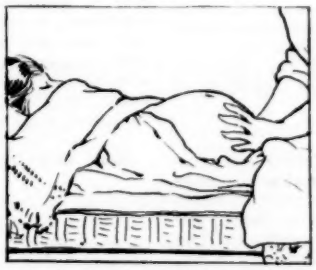
FIG. 3.

Second pelvic grip. The position of the hands indicates flexion of the head towards the right side.

FIG. 4.

Fundal grip; width of grip is important.

FIG. 5.



Grip to compare resistance of two sides of lower abdomen.

FIG. 6.

Grip to determine likelihood of passage of fœtal head through pelvis.

When testing the size of the abdominal swelling and that of the fœtus as compared with the patient's dates, one's attention is drawn to a number of abnormalities, and to the question of multiple pregnancy. If, for instance, we find an abdomen abnormally large for the date, with a head of medium or small proportions, it often pays to search for a second head.

Presentation and Position of the Fœtus.

In the early stages of pregnancy the position is unstable. At 28 to 30 weeks breech presentations are common. Spontaneous version is still liable to occur between 32 and 34 weeks, but after this it is rare. It is interesting to note how often there is change of position in vertex presentations late in pregnancy when the fœtus appears to have settled down to its final position. I have noticed this often, and recently examined a patient at weekly intervals four times running, shortly before delivery, and found L.O.A. and R.O.A. alternatively. The fœtus also quite often takes up positions that do not come into the usual classification.

With regard to the turning of breech presentations, I do not attempt external version until about the thirty-fourth week, since there is still likelihood of its occurring spontaneously. If left later than this date there is often difficulty in performing version on account of the size of the child—the head gets under the costal margin, the breech is engaged in the pelvis, and it is difficult to obtain a grip upon it. In performing version, if the breech is engaged, the patient must rest in the Trendelenburg position until it is disengaged. The head is taken in one hand, the breech in the other, and it is just as important to push the breech up as to draw the head down. No actual force should be used and the manipulation ought not to hurt the patient. If version does not occur with comparative ease, I allow the presentation to persist in normal multigravidæ and in primigravidæ with well-shaped and good-sized pelves. Death of the fœtus or accidental hæmorrhage may occur after version, and the risk of breech delivery in these cases is not great. In primigravidæ with small or even medium-sized pelves version should be performed under an anæsthetic if necessary. An extended breech will rarely turn, since the legs act as splints preventing flexion of the body.

The Fœtal Heart.

In listening for the fœtal heart, it is always wise to take the patient's pulse also. Rapidity of her heart action may be produced through nervousness, and confusion between the two is possible. A monaural stethoscope with a wide base for collecting sound is the most satisfactory instrument for all-round use. Until about the twenty-second week the fœtal heart is often inaudible. Occasionally it is surprisingly distinct, depending largely on the nearness of the fœtal back to the abdominal wall. Until 26 to 28 weeks, when the position of the child begins to stabilise, it is best to listen for the heart over the uterus in the middle line and, if it is not heard there, over some solid part of the fœtus determined by palpation. After the child has adopted a stable position, in all presentations when the back is anterior, the heart is heard best over that part of the back nearest to the heart. It is according to this known position, determined already by palpation, that it should be sought and its intensity compared with that in other positions in cases of doubtful diagnosis. In a vertex presentation with engaged head, the point of maximum intensity is roughly on a line drawn from the umbilicus to the anterior superior spine of the pelvic crest; if the head floats freely above the pelvis it is higher than this. In breech presentations the point of maximum intensity

is rarely above the umbilicus—the head is above the umbilical level, the back below it. Only in those cases where the child's head is under the costal margin—i.e., towards full term with a large child—does one hear it best at the umbilical level or above it. In posterior positions the heart sounds are conducted indirectly, and may not be best heard at the point nearest the heart.

DIAPLYTE TUBERCULIN.

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THE arrival among us of a new tuberculin—for Dreyer's antigen is no less than this, though we may hope it will prove more—again brings into prominence the important subject of dosage and administration of these substances, powerful for harm as well as good, and necessarily given at the start in doses almost immeasurably small. Tuberculin, especially in the treatment of pulmonary tuberculosis, has fallen into practical disuse in this country during the past ten years, and I find but few of the younger physicians among us have had experience of its administration. Our pathologists, moreover, though well versed in the small infrequent dosage suitable to the treatment of localised tuberculosis, have for the most part ignored the method of frequent and rising dosage accepted all the world over as applicable to the treatment of pulmonary and other forms of autotoxic tuberculosis. Under these circumstances I am tempted to restate some of the essentials of safe administration under the latter method, especially with a view to the avoidance of unexpected large reactions which may vitiate the success of the method and imperil the recovery of the patient. I shall speak only of dosage and of method of administration.

Preparation of Antigen.

The preparation of the antigen for injection demands (1) a diluent, in this case sterilised normal saline containing 0·15 per cent. formalin; (2) an accurate tuberculin syringe graduated in 1/10, the barrel for accuracy being about 8 cm. long (syringes of the Record type are the best); (3) a long 10 c.cm. graduated measure or pipette; and (4) some 10 c.cm. stoppered bottles. 1 c.cm. of the "original solution" (in this case Dreyer's antigen) with 9 c.cm. of the diluent now makes dilution 1, whose bottle is so numbered; 1 c.cm. out of this bottle (dil. 1) with 9 c.cm. of diluent now forms dil. 2; and 1 c.cm. of dil. 2 with 9 c.cm. of diluent makes dil. 3, and so on, each dilution being 1/10 strength of the one above. Now it is obvious that 1 c.cm. of dil. 1=0·1 c.cm., 1 c.cm. of dil. 2=0·01 c.cm., and 1 c.cm. of dil. 3=0·001 c.cm. of "original solution," and so on. This is to state the dose in fluid measure, which is now always done for convenience, and also for avoidance of misunderstanding (since Koch often spoke of milligrammes when he meant cubic millimetres, and, moreover, discussion arose as to the solid contents of T.R., which was made from 10 mg. of tubercle bacilli per c.cm., but found to contain whenever completed only 2 mg. of solid substance (Wright; Ruppel)). If it is demanded, for Dreyer's antigen, that a dose be stated in mg. of solid substance, then this is easily arrived at by dividing the dose in c.cm. by 5 (since 1 c.cm. contains 0·2 mg. of antigen). Thus 1 c.cm. of dil. 3 contains 0·001 c.cm. of original solution, or 0·0002 mg. of solid antigen, and 1 division (1/10 c.cm.) of syringe 1/10 of this, or 0·000 02 mg.

Now when we come to the matter of initial dosage we find that Dreyer's antigen is weaker than any of the tuberculins in common use—it may, perhaps, for convenience be considered to be 1/10 strength of T.R., the weakest of the older tuberculins whose initial dose could be safely put at 0·001 c.mm., or 0·000 001 c.cm.—i.e., 1 division (1/10 c.cm.) of dil. 5. With Dreyer's antigen it should be safe, even in febrile cases, to commence with a dose 10 times this strength—i.e., 1 division (1/10 c.cm.) of dil. 4. In afebrile cases a dose of 2½ or 5 divisions (¼ or ½ c.cm.) of dil. 4 should be safe, this latter representing 1/100 000 mg. of the solid antigen.

Dosage.

So much for dose nomenclature, which need, fortunately, no more be bothered with once the initial dose is decided on. After that the dosage runs up in divisions of the 1 c.cm. syringe from one diluent to the next, from dil. 4 to dil. 3, to dil. 2, and so on. It is, in especial, of the method of graduating this rising dosage that I wish most emphatically to speak. It is here that danger to the patient arises, since avoidance of unexpected reactions (I shall say nothing here of reactions deliberately forced!) depends very closely on the smoothness of this upward gradient of dosage. Now it is obvious that if we rise in divisions of the syringe 1, 2, 3, 4, 5, 6, 7, 8, 9, that is in arithmetic progression, that the rise from 1 to 2 is doubling while the rise from 8 to 9 is but an increase of 1/8—the rise 1 to 2 is a "cliff" in dosage at which a "reaction" is likely to occur. Tuberculin administrators have got over this difficulty by making such a sequence as 1, 1·5, 2, 3, 5, 7, 10, 15, &c., but this is, after all, but a rough and ready device which meets the need but partially. It does not really do away with "cliffs," and it condemns us to a rapidity of rise which may not suit the particular case under treatment. We require, not only a smooth rise, but a rise whose steepness we can modify to meet the individual case. The only logical way to achieve these two ends is by the use of a table where doses rise in geometrical progression, always by the same multiple, however small, and where many different gradients are provided to choose from. Such a table was prepared for Lawrason Brown in the past, and a modification of it, made by Egbert Morland for a book on Tuberculin Treatment in which he and I collaborated,[1] is here in part reproduced. In this

10·0	10·0	10·0	10·0	10·0	10·0	10·0	10·0
				7·5	7·9	8·3	8·6
			6·8				7·4
		6·3			6·3	6·8	6·3
	5·6			5·6		5·6	5·4
4·6			4·6		5·0	4·6	4·65
		4·0		4·2	4·0	3·8	4·0
	3·2		3·2	3·2	3·2	3·2	3·4
						2·65	2·9
		2·5		2·4	2·5		2·5
2·2			2·2		2·0	2·2	2·15
	1·8			1·8		1·8	1·85
		1·6			1·6	1·5	1·6
			1·5	1·3	1·3	1·2	1·4
							1·2
1·0	1·0	1·0	1·0	1·0	1·0	1·0	1·0
3	4	5	6	8	10	12	15

table the numbers refer to divisions of the 1 c.cm. tuberculin syringe (which must be divided in 1/10). Since no more than 1 c.cm. can be given with this syringe no mistake can be made with these numbers, and the decimal point may be put in or omitted as desired. Having ascended a column of dosage on one dilution, we pass to the next stronger dilution and work up it on the same basis, 1 division (1/10 c.cm.) of the new, stronger dilution being equal to 1 c.cm. of that we are leaving.

With such a table the initial dose, generally much below the patient's reaction point, may be rapidly pushed up, on a basis of 3 or 4 doses to each dilution or by doubling (a convenient plan), till it begins to be

[1] Tuberculin Treatment. London: Oxford Medical Publications. Second edition. 1913.

effective, and thereafter a basis of, say, 10 or 12 doses to each dilution (see Table [10] and [12]) may be used to continue the treatment. In recording the dosage it is convenient to put the "dilution" as a number in a circle, and the "basis" of dosage—i.e., its gradient—as a number in a square. Thus at a glance the whole dosage and method are made apparent. For instance, starting with 2·5 divisions of the syringe in dil. 4, the doses might read as follows: (4) 2·5, (4) 5, (4) 10 (or (3) 1 which is the same), (3) 2, (3) 4. At this point, up to which we have doubled, let us suppose evidence of "reaction," that is, that the dose has now become "effective." Now we need to get on to a slower "basis," let us say [10], and we continue (3) 5, (3) 6·3, (3) 7·9, (3) 10, (2) 1·3, (2) 1·6, &c.

Of the means whereby control of dosage is attained, that is reactions and "subreactions," I shall not speak here, except to remark that it seems likely "local reactions" will play small part in control of dosage by Dreyer's antigen, and that hence we must be all the more watchful for slight effects on temperature (both down and up) and on general symptoms, as indications that the "threshold of response" is reached, and a more sloping gradient of dosage indicated.

If much of the foregoing seems elementary and obvious may I plead first the supreme importance to our patients that it should be understood by all; secondly, the extraordinary ease with which mistakes in tuberculin dosage may be, and have been, made; and, thirdly, the importance that any "new era" should escape disaster at the outset. If this communication is the means of spreading the use of "geometrical dosage" I feel that it will have served a useful purpose.

THREE CASES OF BILATERAL RENAL CALCULUS.

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THE following cases illustrate some important points in the diagnosis and treatment of bilateral renal calculi.

CASE 1.—Female, aged 31, was admitted to the Norfolk and Norwich Hospital on August 9th, 1921, complaining of pain in right side of abdomen.

History.—The patient stated that during the last six years she had suffered with occasional attacks of pain in the right side of the abdomen, the pain radiating into the right loin. The attacks of pain varied in severity, but on five or six occasions she was confined to bed for about a week. The severe attacks were followed by the passage of small stones with the urine; and on five or six occasions she had passed at least 12 stones during each attack. She had never, so far as she knew, passed any blood in the urine. On August 5th, feeling quite well, she went to the seaside; on the 6th she was seized with a very severe pain in the right side of the abdomen. The urine was thick and she passed it frequently with severe pain. On the 7th she returned home and was admitted to hospital on the 9th.

Condition on Admission.—The patient is a pale, ill-nourished weakly-looking woman. Temperature 100° F., pulse 98, respirations 24. Eyes: pupils equal reaction to light and accommodation; tongue furred. Chest: thin, moves well and equally; lungs normal. Heart: apex beat fifth space inside nipple line; sounds normal. Abdomen: not distended; abdominal wall thin and lax. A swelling, seen descending below the right costal margin, moved on respiration. The swelling was easily palpated; it had well-defined margins, did not cross the middle line, was easily pushed back into the loin; its manipulation caused much pain. The swelling was resonant. Several hard bodies like renal calculi could be felt; on manipulation a sensation of crepitus was also felt. Left kidney not palpable or painful.

Urine, specific gravity 1012, alkaline, no blood or casts; albumin, a trace. There was a sediment on standing and the urine contained a large quantity of pus. Re-examination: Pelvis of right kidney contained many calculi. There were two stones in the left kidney.

The patient, after a week's treatment, considerably improved; the temperature fell to normal, and the amount of pus in the urine considerably decreased.

Operation.—Right pyelo-lithotomy and removal of 23 calculi on August 15th. Under chloroform and ether the kidney was exposed by a right lumbar incision, 5 inches in length, separated from the surrounding perinephric tissue, and delivered through the incision without difficulty. The pelvis of the kidney was much dilated; it was incised and three large and 20 small calculi were removed. They were faceted and irregular in shape, the three large ones having a deposit of phosphates upon them. The total weight of the 23 was ¾ oz. A considerable part of the kidney tissue had been destroyed, but a fair amount of secreting tissue remained. A catheter was passed through the pelvis of the kidney and so into the ureter and bladder. There was no obstruction, the catheter was removed, and the incision in the pelvis closed. The lumbar incision was closed, with drainage. The patient made a good recovery. The lumbar wound healed in four weeks, and the patient was sent to a convalescent home.

Second Admission to Hospital.—The patient was again admitted on Dec. 3rd, 1921. Her general condition had much improved; she had increased in weight and had no pain since her discharge from hospital. On examination, the right kidney was only just palpable; no pain in right loin. Urine: Specific gravity 1010, acid; albumin, a trace; small amount of pus still present. X ray examination: no stone now present in right kidney; two stones in left kidney.

Operation.—On the 6th, left lumbar nephrolithotomy, two stones were removed; they were similar in substance to those removed from the right kidney, and weighed ¾ oz. together. The wound was closed with drainage, and the patient made a good recovery from the operation, the wound being quite healed three weeks after the operation.

CASE 2.—Male, aged 36, admitted to the Norfolk and Norwich Hospital on August 7th, 1921, complaining of dull aching pain in both loins.

History.—Patient stated that in 1914 he began to notice dull aching pain in both loins. In October of that year he was admitted to a Naval Hospital after passing a small quantity of blood in the urine. He was X rayed, and calculi were found in both kidneys. He was discharged from the Service without operation. During the past five years he had suffered with occasional attacks of pain in the loins. The attacks of pain had got more frequent of late and he had never felt quite well.

Condition on Admission.—The patient was a healthy-looking, well-developed man. Temperature 98° F., pulse 80, respirations 18. Eyes reacted to light and accommodation, Cranial nerves normal, tongue clean, tonsils not enlarged, no palpable lymphatic glands in neck. Chest: heart and lungs normal. Abdomen: abdominal wall muscular and well developed, moved well and equally on respiration, abdomen not distended. There is tenderness on palpation over both kidneys, especially the left, the lower pole of which is palpable. The liver is not enlarged, no tenderness over the appendix. Upper and lower extremities normal. Urine: quantity, two pints in 24 hours; reaction acid; specific gravity, 1014; albumin, a trace. No blood. A few pus cells present on microscopic examination. X ray examination: A large stone in pelvis of right kidney, a small stone in pelvis of left kidney. Cystoscopic examination: urine could be seen coming from the right ureteral orifice, but none from the left. It was concluded that the upper end of the left ureter was blocked by a stone. Operation advised.

Operation.—On August 22nd a left pyelo-lithotomy. Left kidney exposed through a left lumbar incision, separated from the surrounding tissues and drawn out of the wound; a calculus could be felt in the pelvis of the kidney and upper part of the ureter. The kidney was turned forwards and upwards so as to expose the posterior aspect of the pelvis. An incision was made into the posterior aspect and a stone extracted without difficulty. The ureter was then explored by passing a catheter from its exposed upper end into the bladder. There was no obstruction. The incision in the pelvis was then sutured, and the kidney returned into its bed. The lumbar wound was closed with drainage. The wound healed in the course of three weeks and there was no discharge of urine from the loin. The patient was discharged from hospital a month after operation.

Second Admission to Hospital.—The patient was again admitted in October, 1921; on Oct. 30th, the right kidney was explored and two large stones were removed from the pelvis and cortex of kidney. The ureter was examined and no obstruction was found; the wound was closed with drainage and the patient made a good recovery. The stones consisted of phosphates. Two branched, faceted stones were removed from the right kidney, together weighing 1½ oz. One beak-shaped stone removed from the left kidney and ureter, weight ¾ oz.

CASE 3.—A male, aged 46, a sailor, was admitted to hospital on Oct. 10th, 1918, complaining of pain in left loin and occasional passage of blood with the urine.

History.—The patient stated that in 1902 a stone was removed from the left kidney. He remained in good health until about 1917, when he began to suffer with attacks of pain in the left loin, the pain being referred to the groin. After a severe attack of pain he would occasionally pass a little blood in the urine. He served in the Navy from 1914 until October, 1918, when he was admitted to hospital.

Condition on Admission.—A fairly healthy-looking man. Temperature 98° F., pulse 88, respirations 20. Cranial nerve normal, tongue clean, heart and lungs normal. Abdomen: moved well and equally on respiration, no distension, tenderness on palpation over both loins, but the kidneys could not be felt; liver not enlarged; a scar in the left loin, the result of a previous operation. Urine: specific gravity 1016, acid; no albumin, no sugar, On microscopic examination a few red blood cells present. X ray examination: A stone in each kidney.

Operations.—On Nov. 14th left lumbar pyelo-lithotomy was performed and a large, single, flattened stone removed from the pelvis of left kidney. The pelvis was sutured and the wound closed with drainage. There was no escape of urine through the loin, and the wound healed by primary union. On Jan. 9th a similar operation was performed on the right side and a single stone was removed from the pelvis of the right kidney. The patient made an excellent recovery from the operation. An X ray examination was made after the operation and no sign of stones was to be seen; but stones recurred in both kidneys and the latter were again explored in 1920, stones being removed from the pelvis of each kidney. The patient made a good recovery after each operation.

Remarks.

Sir John Bland-Sutton in his recent selected essays remarks, "The fate of patients who have stones removed from one or both kidneys is an important matter, and one on which little has been written." Among points for consideration in cases of bilateral renal calculi perhaps the most important are: (1) Do the symptoms and physical signs indicate operative treatment? (2) If operative treatment is indicated shall both kidneys be operated upon at the same time or shall one be operated upon before the other? (3) By what method shall the calculi be removed from the kidney? Operative treatment must not be considered necessary simply because X ray investigation shows calculi in the kidneys; the position of the calculi, their size and shape, the symptoms and physical signs to which they give rise, should all be taken into consideration. The three cases described illustrate some interesting features of the disease. Renal calculus may be one of the most chronic surgical diseases, but complications such as renal colic, infection of the urinary tract, and calculous anuria—the gravest and most fatal of all urinary calamities—may occur at any time and almost without warning. Although the ordinary text-books on surgery do not seem to urge operations on cases of bilateral renal calculi, it would seem well to perform it as early as possible in suitable cases where complications seem likely to occur to prevent excessive damage to the kidney taking place from the pressure of the stone, and to prevent the possibility of calculous anuria. The operation, if done at the proper time and in the proper way to avoid complication, and not because of their development, should have a very low mortality.

When operative treatment is indicated, most surgeons consider it best to operate on one kidney at a time, allowing a reasonable interval to elapse before the other operation, but some have advocated operating on both kidneys at the same time; if, however, the only reason for operating on both kidneys at one time is the desire to avoid a second operation, it does not seem to me to be sufficient. When the kidney has been exposed, the importance of determining the correct procedure for the investigation of the kidney and for the relief of the condition present cannot be over-estimated. Sometimes it is not easy to locate the stone; in such a case it is always wise only to do nephrolithotomy or splitting of the kidney as a last resort. This procedure is rarely necessary. Nearly all stones can be located and removed by the performance of pyelotomy and pyelolithotomy combined with the operation that may be described as restricted nephrolithotomy—that is, the making of a small incision through the cortex of the kidney and removing a stone through this small incision. In some complicated cases it may be necessary to remove the kidney.

The length of time during which patients may suffer from renal calculus is noteworthy; in these three cases the condition had in every case been present for more than five years, and in one case over 20 years. In this, as in other surgical diseases, it is often the complications that bring the patient under observation. The disease itself may be present for a considerable time without causing any symptoms.

In bilateral renal calculus it would seem that it is common for the patient to refer the symptoms to the side only, and it would often be impossible to make a diagnosis without the assistance of the X ray. Each case illustrates the importance of X raying the entire urinary tract when a stone has been found in any part of it. It has been recorded that the first successful skiagram of renal calculus was taken by J. McIntyre, of Glasgow, in 1896. When it is realised that 50 per cent. of the patients sent to the radiographer with the diagnosis ? renal calculus are returned as negative, it at once becomes apparent what an important factor the X ray has in the diagnosis. It is almost impossible to diagnose bilateral stone without the aid of X ray. The cystoscope is of additional use in deciding on which kidney to operate, and gives definite information as to the obstruction to the ureter. It is uncommon to be able to palpate renal stones, but in one of the cases recorded this could be done without any difficulty. Similar cases have been recorded by Pick and Morris.

Bilateral renal calculi are not uncommon, but not many records of the treatment of such cases are to be found in the literature. Kummel, in 101 consecutive cases of renal calculi, found both kidneys involved in 16 cases. Bevan states that the proportion of bilateral cases numbers about 20 per cent. Küster, in 764 cases of stone, found 90 bilateral; he collected 20 cases in which double operations were performed, and found ten successful cases, three recovered with fistula, and seven died, the deaths being due in most cases to uræmia. Simpson, of Liverpool, has recorded an interesting case of bilateral nephrolithotomy for multiple calculi in a boy aged 8; in his paper he mentions some details of the history of the operation for removal of stones from the kidney. He records that the operation is said to have been performed in the time of Hippocrates, but not again for many centuries after that time. In 1579 it is recorded that Paré operated upon an archer reprieved from death, but it is not stated that the stone was removed.

In 1696 Marchette, of Padua, is said to have extracted a stone from the right kidney of the English consul at Vienna, and in 1773 Paul, of Stroud, is believed to have removed a stone from the back of a woman and effected a cure. The discovery of anæsthetic and antiseptic soon made the removal of stones from the kidney an operation which might be undertaken with some hope of success. In 1869 Thomas Smith described the operation and Dawson, of Ohio, tried it in 1872, but the patient died. At St. Bartholomew's Hospital Callender, in 1873, and Morrant Baker, in 1874, attempted the operation, but both patients died. In 1876 Savory, guided by a sinus, tried it again and cured his patient. In 1878 Teale operated upon an unsuccessful case, and in 1880 Morris successfully recovered a stone from the kidney. From that time onwards the operations on the kidney have been numerous and successful.

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DUODENAL DIVERTICULA.

WITH REPORT OF A CASE OF GANGRENOUS DIVERTICULITIS.

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HISTORICALLY our knowledge of duodenal diverticula can be divided into three stages. (*a*) A long period of just over 200 years from 1710 to 1912; during this period these pouches were recognised as being occasionally present, and gradually their macroscopic and microscopic appearances were described. (*b*) A short period from 1912 to 1922; in these ten years it was shown that the condition could sometimes be discovered in the living subject by means of the X rays. (*c*) The third stage—that of the description of pathological conditions of these pouches and the resulting symptoms; this has largely followed on and depended upon the work of the radiologist.

In 1710 Chomel[1] discovered post mortem in the body of a female, aged 80, who had died of apoplexy, a pouch connected with the duodenum, which contained 22 stones of a yellow-white colour, with polished surfaces and solid but not stony hard consistency. He then described the symptoms from which she suffered: "La dame qui portoit ces pierres ne vomissoit point; mais deux heures après qu'elle avoit mangé elle sentoit une legere douleur vers l'endroit où le sac étoit placé. C'étoit-la justement le temps où le chile de la nouvelle digestion couloit dans le duodénum, qui ne lui donnoit pas un passage assés libre, parcequ'il étoit comprimé et gesné par le sac." From this description it is doubtful whether the pouch would correspond with an ordinary duodenal diverticulum.

In 1761 followed Morgagni's[2] description, "in the body of an apoplectic man—a diverticulum connected with the duodenum about 2 inches below the pylorus, which was a kind of cellule not very protuberating, but big enough to admit a finger, with no trace of present or past ulceration." The first description in this country was by Habershon[3] in 1857, who said, "diverticula have been noticed but are exceedingly rare as compared with those arising from the lower part of the ileum; these pouches in the duodenum consist generally of mucous membrane and might be considered as a form of hernial protrusion of that membrane." From this time onwards pouches were described by various authors, and in 1893 Perry and Shaw[4] discussed 14 cases, dividing the pouches into two types—(i.) those in which the surrounding intestine was apparently normal, and (ii.) those in which the pouch was the result of ulceration or traction. They also discussed the age incidence, sex, site, and the fact that the pouches are occasionally multiple. Keith also in 1903 and 1910[13] increased our knowledge of this subject. The result of these various descriptions was that in 1911 Buschi of Bologna[5] was able to summarise 54 cases.

In 1912 Bauer[6] mentioned a case in which a pouch was thought to have caused pyloric obstruction; operative treatment (gastro-jejunostomy) was carried out, but the patient died on the eleventh day. The first pouch said to have been removed surgically was reported in 1914 by Forssell and Key, quoted by Case,[17] in a female of 41; the condition was discovered by means of X rays and removal yielded a cure of persistent digestive complaints. In 1917 Ritchie and McWhorter[7] found 76 cases in the literature with 97 diverticula, together with 11 cases with 12 diverticula published by radiologists. The radiological aspect was developed largely by Cole, Case,[17] and in this country by Spriggs.[8]

Causation.

There has been much discussion as to the manner in which these pouches are produced, and various theories have been advanced. The following ætiological factors have to be considered: (1) Whether these diverticula are congenital or acquired; (2) if acquired, whether of the traction or pressure type.

- Diverticula
  - Congenital (true)*
  - Acquired (usually false)
    - Traction
    - Pressure
      - Weakness of wall.
      - Pressure within.

* i.e., composed of all layers of the bowel wall.

It will be seen from the following that these duodenal diverticula are of various types, into whose formation the above factors enter.

Congenital Diverticula.

Many observers regard duodenal diverticula as being of congenital origin, and have advanced the following points to support this theory:—

(1) The duodenum gives off the pancreatic and biliary buds and so is regarded as being a likely site from which, owing to excessive activity, other similar buds might be extruded; but it is to be noted that diverticula are also common in the colon, especially the lower colon, where there are no such organs as the liver and pancreas developed, whereas in the region of the cæcum and ascending colon, where there is a bud (the appendix), these diverticula are rare.

(2) The presence of portions of pancreatic tissue in the wall. This, however, could be accounted for otherwise, as the presence of such islands of pancreas in the muscular wall of the duodenum would leave a weak area from which during life a pouch might be developed.

(3) The absence in the majority of cases of any pathological condition—e.g., ulcers, adhesions, &c. This is certainly the case, but a pathological condition is by no means essential to the production of a pressure pouch.

(4) A case of Shaw's[9] in which, in association with atresia of the duodenum, there was a congenital sac. This shows the undoubted possibility of these pouches being congenital in origin, but here there was atresia of the duodenum, and so the condition was far from representative; moreover, the pouch was shallow and arose from the first part of the duodenum, a rare position.

(5) Buschi[5] observes that on account of the fluid nature of the duodenal contents the stasis would have to be of a high grade to produce pouches. It would seem, however, that the pressure exerted by fluid, even if slight, might start a pouch at some weak site, and once formed the condition would be progressive.

(6) In Ritchie and McWhorter's case[7] the history goes back to childhood and so suggests a congenital origin. This does not appear to be a very forcible argument, as a history of digestive disturbance cannot be definitely assigned to the presence of such a pouch.

(7) The presence of associated abnormalities—e.g., œsophageal pouches, bladder pouches, &c.

(8) Lewis and Thyng[10] showed the presence of intestinal diverticula in embryos of the pig, rabbit, and man.

(9) The fact that the diverticulum may be composed of all layers of the normal duodenum. This is, however, uncommon—an example is afforded by a case recorded by Murchison[11] and the case is reported below.

The conclusion may then be drawn that congenital pouches may occur, but they probably only form a small percentage of duodenal diverticula. Evidence in favour of an acquired origin of these pouches is as follows:—

(*a*) Anatomically, the pouches usually arise from weak areas of the wall—e.g., the retro-peritoneal aspect, and where the musculature is weakened by the passage of the pancreatic and biliary ducts or by blood vessels. In a case reported by Dorrance[12] the opening was situated 3·5 cm. below the papilla, but in this case there was a large artery and vein situated in the wall.

(*b*) Histologically, as will be shown below, in the majority of cases reported the structure of the wall was that of a false diverticulum—i.e., not composed of all layers of the duodenal wall.

(*c*) Clinically and radiologically, these pouches have usually been discovered in old subjects, and very rarely described in the young.

(*d*) Experimentally, it has been found that if produced artificially the rupture occurred regularly in the retro-peritoneal aspect. Too much weight cannot, however, be attributed to this, as other workers have failed to confirm this observation.

(*e*) By analogy, colonic diverticula arise at the site of penetration of the muscular coat by blood vessels.

(*f*) Some are definitely of an acquired origin and due to traction, but these form a small proportion. The traction may be due to adhesions from gall-bladder disease, or, some authors say, to an atrophic pancreatitis; more probably,

however, in this latter case the pancreatitis is secondary to the presence of the diverticulum. It is improbable that the pancreas causes traction pouches, because (1) there are many cases of pancreatitis without diverticula, (2) the pouches are usually easily separated from the pancreas. Keith [13] says traction pouches may be produced in association with visceroptosis, by a prolapsed condition of the duodenum resulting in dragging by the common bile duct.

In the London Hospital in March, 1922, a case under the care of, and operated upon by, Mr. A. J. Walton afforded rather an unusual example of a traction pouch, occurring, however, in the first part of the duodenum.

A married woman, aged 38, admitted on March 6th, 1922. The pre-operative diagnosis was lesser curve ulcer—pyloric obstruction, visceroptosis. On the 7th a barium meal examination was made by Dr. M. H. Jupe, who reported "Bilocular stomach with penetrating ulcer of the lesser curve; gastroptosis and a peculiar condition of the duodenum, so that it appeared to pass transversely to the left to the region of the ulcer." Operation was performed on the 8th: partial gastrectomy, removal of first stage duodenum, appendicectomy. There was an ulcer of the lesser curve adherent to the pancreas and with hour-glass constriction of the stomach; in the duodenum there was a pouch, ¾ in. × 1½ in., adherent to the lesser curve ulcer.

FIG. 1.—*Section of Apex of Inflamed True Diverticulum of Duodenum (case reported below).*

Shows partly necrosed mucosa and submucosa. That the diverticulum is true is shown by the presence of remnants of the muscular coat close to Brunner's glands at the point marked A. The muscularis mucosæ, which should lie superficial to Brunner's glands, cannot be recognised. There is great congestion of vessels and hæmorrhage with acute inflammatory infiltration.

Description of Pouches.

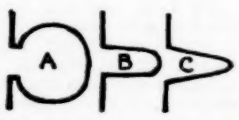
Duodenal pouches may arise from any of the three portions into which the duodenum is anatomically divided. The great majority are found in the second portion of this segment of the intestine and particularly on the postero-internal aspect, in close relation to the ampulla of Vater, so that diverticula at this particular site have been termed by the French "diverticules périvatériens" (Letulle). Spriggs [8] analysed the position of the neck of the sac in 57 cases and obtained the following figures: First part, 11; second part, 41; third part, 3; first and second parts, 2. This, however, probably gives rather a high proportion for those situated in the first part, as he quotes his own ten cases, none of which were in the first part; also Ritchie and McWhorter [7] in their 97 diverticula found only eight in the first stage.

From its duodenal origin the pouch may extend in any direction, but by far the most common is inwards towards the concavity of the duodenum, where it comes into close relationship with the pancreas, from which, however, as a rule it separates readily. Extending in this direction and originating in the region of the ampulla the diverticulum must of necessity be intimately related to the bile duct, which, as a rule, lies on the posterior or lateral wall, but the pouch may be actually constricted or rendered bifid by the common bile duct (Fig. 2); occasionally the bile passage opens on the fundus of the sac.

FIG. 2.

Relationship of diverticula to common bile duct (after Sir A. Keith.)
C.B.D.=Common bile duct.
R.D.=Right diverticulum.
L.D.=Left diverticulum.

FIG. 3.



Shapes of diverticula.
A, Flask-shaped. B, Cylindrical. C, Conical.

In size there is considerable variation, ranging from the size of a pea to that of a hen's egg, but most commonly of an intermediate size, about that of a walnut. At its duodenal opening the mouth of the pouch is usually comparatively wide and will usually admit the little finger, and may be still wider; from this origin the pouch extends outwards and may be flask shaped, cylindrical, or conical (Fig. 3).

The sac may be empty, and when exposed at operation becomes distended with gas. Instead of being empty, however, it may contain clear mucoid fluid, chyme, and (rarely) biliary sediment and bile-stained fluid, as in a post-mortem example recorded by Bassett,[14] in which the bile papilla opened at the lower lateral edge of the aperture of the pouch.

In structure the wall is thin; on microscopic examination, if the pouch is of the true type, it will be composed of all the layers of the duodenum, and the mucosa will show crypts of Lieberkuhn and Brunner's glands (Murchison's case[11]). More commonly, however, the diverticula are of the false type and composed of a mucosa, from which Brunner's glands are usually absent; the muscularis usually forms a well-defined ring at the base, but is deficient over the remainder of the sac, though sometimes a few fibres may be traced for a variable distance over the sac from the neck; occasionally a few atrophic fibres of the muscular coat cover the whole sac. Portions of pancreatic tissue may be found.

Frequency.—These diverticula are undoubtedly much more common than was formerly realised, and probably occur in from 1 to 2 per cent. of human subjects. Baldwin[15], 1911, found 15 diverticula in 115 cadavera. Linsmayer,[16] 1914, found 45 diverticula in 1367 autopsies (3·4 per cent.). Case[17] found 85 diverticula in 6847 X ray examinations (1·2 per cent.). Wyllys Andrews[18] found 26 deformities in 2200 X ray examinations (1·2 per cent.). Spriggs[8] found 10 diverticula in over 1000 X ray examinations. In about one-fifth of the cases the diverticula are multiple and there may be as many as five present.

Age.—Diverticula may be found at all ages from birth onwards, but much more commonly in old subjects; according to Buschi[5] 80 per cent. occur after the age of 50 years.

Pathological Conditions Superimposed upon Diverticula.

Although duodenal diverticula are much more frequently present than was formerly imagined, yet pathological conditions of these pouches are extremely rare, either in the living subject or at necropsy. This fact is, undoubtedly, due to two factors—(*a*) the sterility of the duodenal contents, and (*b*) the fact that there is little tendency to stagnation on account of the wide opening into the duodenum and the fluid nature of the contents. Infection plus stagnation are the two great factors in causing inflammation of diverticula, as exemplified in the appendix and again in colonic diverticula. The rate of emptying of duodenal diverticula varies, and, as most frequently there is no musculature in the pouch wall, must of necessity depend largely on mechanical factors, and so be influenced by the part of the duodenum from which the sac originates and the direction it takes. Case,[17] from X ray observations, states that the opening of the pouch is usually so large that barium leaves almost as rapidly as it enters. In a case reported by Basch[19] and operated upon by Elsberg, the pouch was dependent from the junction of the second and third portions of the duodenum, and bismuth retention occurred at the end of 96 hours; this case had associated symptoms.

The pathological conditions which may be found are: (*a*) Of the diverticulum itself, acute or chronic inflammation. (*b*) Results of the spread of inflammation, chronic duodenal catarrh, pancreatitis. (*c*) Mechanical results: interference with the passage of intestinal contents giving rise to duodenal dilatation; obstruction of the biliary and pancreatic ducts. (*d*) Pathological conditions, giving rise to the formation of the diverticulum.

Acute Inflammations.—These are rare. Bassett[14] recorded a condition discovered post mortem of a pouch filled with blood-stained fluid; microscopically the changes were those of a hæmorrhagic inflammation and there was an associated localised pancreatitis. In 1919 Akerlund[20] reported a case in which the sac contained a mass of necrotic pancreatic tissue, which had resulted from extension of the diverticulitis. Below is reported a case, admitted as an emergency, in which there was an acute inflammation of a thin-walled friable sac with the mucosa entirely gangrenous.

Chronic Inflammations.—These are considered to be of more frequent occurrence; a number of cases have been published in which the symptoms have been attributed to this condition, but as to how far these symptoms are actually due to these diverticula or to other associated conditions it is difficult to judge at present, as the pathological state has not usually been mentioned, any post mortem description being mainly concerned with determining whether the diverticulum is true or false.

Results of Spread of Inflammation.

Wilkie[21] in two of his three cases considered that stagnation may have led to chronic duodenal catarrh; one of these cases, in which there were associated folds in the duodenum, died of hæmorrhagic pancreatitis, the other had a number of associated pathological conditions—viz., duodenal ulcer, cirrhosis of the liver, cholecystitis, and gall-stones. Inflammation spreading from the diverticulum may involve the closely surrounding pancreas and give rise to a localised condition of chronic pancreatitis with resulting adhesions between the sac and the pancreas. An example of such a condition is afforded in a female patient of Case's,[17] aged 45, who complained of pain in the lower dorsal region. X ray showed a diverticulum in which the food was retained a little longer than it took the stomach to empty. At operation a diverticulum was found 5 cm. above the duodeno-jejunal flexure; it was not removed because of close adhesions to the pancreas; appendicectomy and cholecystectomy were performed.

Mechanical Results.—(*a*) Interference with the passage of intestinal contents. Bauer[6] reported a case in which a large diverticulum of the second portion of the duodenum was thought to have pulled on the pylorus and to have caused persistent vomiting and emaciation; gastro-jejunostomy was performed but failed to stop the vomiting, and death occurred on the eleventh day. Post mortem there was dilatation of the stomach and of the duodenum above the site of the pouch. Similarly, in the case reported by Basch,[19] and operated upon by Elsberg, there was a dilatation of the duodenum above the diverticulum.

(*b*) Obstruction to the biliary and pancreatic ducts. Many of the cases of diverticula are associated with disease of the biliary tract and pancreatitis, as in the case of Wilkie's[21] above mentioned with associated gall-stones. This may be due to a mechanical obstruction of the ducts, or, as suggested by Akerlund,[20] due to a catarrhal inflammation giving rise to swelling and secondary dilatation of the ampulla of Vater, with insufficiency of the sphincter and so a pancreatitis.

(*c*) Pathological conditions associated. These may be either causative of the pouch—e.g., gall-bladder disease, duodenal ulcers, &c.—or merely accidentally associated.

Symptoms and Signs.

As a rule these pouches give rise to no symptoms, because there are rarely any pathological lesions of the diverticula. In cases of acute diverticulitis, as in the case reported below, the symptoms are the same as those of an acute inflammation of any diverticulum, and so will simulate appendicitis in association with an undescended cæcum, and the signs will correspond. In those cases in which the condition is not acute the symptoms will vary and consist of: (*a*) Those of accidentally associated conditions in which the pouch is discovered in the routine X ray examination; (*b*) those due to pathological conditions secondary to the diverticulum—e.g., duodenal obstruction with nausea and vomiting, biliary obstruction, and chronic pancreatitis; (*c*) those due to pathological conditions of the pouch itself. A typical case of this group is one reported by Lewis[23] in a patient who six years previously had an attack of pain two to three hours after meals relieved by the next meal. The condition then subsided, to be followed by a three years' history of pain in the right upper quadrant of the abdomen, radiating to the right shoulder and scapula, this pain coming on two to three times a week. The onset of the pain was gradual, becoming worse during the course of the day and reaching its height at about 5 P.M.; there was occasional nausea and occasional jaundice. Operation showed a diverticulum on the anterior wall of the first stage of the duodenum, and its removal yielded relief of symptoms. Moore[23] also records a case in which the main symptom was pain coming on late after meals, and observes that the pain was worse in the afternoons; this may possibly be due to the pouch filling during the day and emptying during the night.

Other symptoms are nausea, flatulence, "sour stomach," distension, and fullness. It will be seen that such pouches may give symptoms simulating the other surgical dyspepsias—e.g., gall-stones, duodenal ulcer, &c.

Treatment.

As a rule treatment is not required because of the lack of symptoms. On the other hand, if these diverticula are discovered during a barium meal examination of a patient, who is complaining of abdominal symptoms, their removal is indicated. If possible, X ray localisation should be careful and accurate, as otherwise great difficulty may be encountered in finding a retro-peritoneal pouch at operation. The treatment is—(1) invagination of the diverticulum if small, or (2) excision if too large for this form of treatment. On account of narrowing of the lumen of the bowel as a result of excision it may be necessary to combine with the above a gastro-jejunostomy, or, if the pouch is of the third portion of the duodenum, a duodeno-jejunostomy. Occasionally the diverticulum may arise from the first stage of the duodenum and be combined with a pyloric ulcer, as in Murchison's case,[11]

when the pylorus and the first portion of the duodenum were removed and anastomosis performed. Mr. Walton's case quoted above affords a similar example.

Case Record.—Married woman aged 27; occupation, household duties.

Past History.—Influenza. No history of indigestion of any description.

Present Illness.—Onset March 20th, 1923, at 1 P.M. Abdominal pain in epigastric region, of a dragging character and giving rise to a feeling of nausea. Later the pain settled in right hypochondrium. Vomited four times.

Progress.—On the 21st, at 3 A.M., pain became worse and persisted until 8 A.M., when it lessened somewhat. Bowels regular; micturition not affected.

Condition on Admission.—Thin woman with a sallow complexion. Temperature 101·3° F., pulse 108 per minute. Abdomen: Marked tenderness and rigidity of the upper half of the right rectus muscle; no palpable tumour; muscles of lower right abdomen flaccid. Hyperæsthesia nil. Urine, heart, lungs, and nervous system, nothing abnormal discovered.

Pre-operative Diagnosis.—Acute inflammation of a vermiform appendix situated under the liver.

Operation.—At 9.45 P.M. on the 21st, under general anæsthesia (A.C.E. and ether), by Mr. W. Thomas. No tumour palpable. Right paramedian incision 4 in. in length, extending upwards from the umbilicus. The cæcum came up freely into the wound and the appendix appeared normal. The appendix was removed. A flake of lymph was observed to come down from the right upper abdomen. On prolongation of incision upwards, the stomach, gall-bladder, and first stage of duodenum were found to be normal. In the area between the duodenum and the gall-bladder and situated on the posterior abdominal wall was a lump, surrounded by an area of infiltration and œdema, and situated in front of the kidney, which could be moved behind it. The gastro-colic omentum was opened and the pancreas found to be apparently normal. An incision was made through the posterior peritoneum above and to the outer side of the duodenum; it was then possible to separate out a pouch from the retro-peritoneal tissues. This pouch had a diameter of 1 in., and was thin-walled and black in its centre. (Fig. 1 shows a section of the apex of this diverticulum.) The mucosa was black; the pouch was empty except for a small amount of friable golden-yellow debris; in the lower portion there was a communication into the duodenum in the region of the ampulla of Vater which would admit the little finger. The diverticulum was not connected with the bile ducts. It was cut away, the neck being sutured with a running catgut suture; an endeavour being made to put in a second invaginating suture, bleeding occurred from the inner portion of the neck, and this suture had to be abandoned and the bleeding controlled. The posterior peritoneum was sutured as best possible, but was extremely friable. Stab drainage laterally. Abdomen closed in layers and with tension sutures.

Progress.—Three days after operation the stab wound started to discharge freely and there was a fistulous communication. On the tenth day the stitches were removed, the laparotomy wound having healed by first intention; discharge from the stab wound was diminishing. On the seventeenth day the discharge had ceased and the stab wound was granulating. Patient was sent to convalescent home on twenty-first day.

In conclusion, my thanks are due to Sir Hugh Rigby and Mr. A. J. Walton for kindly giving me permission to publish their cases.

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FURTHER RESEARCH ON THE RELATION OF CARCINOMA TO INFECTION.

BY W. M. FORD ROBERTSON.

IN a paper by my late father, Dr. William Ford Robertson,[1] read before the Section of Pathology and Bacteriology[2] of the British Medical Association, Newcastle-upon-Tyne, July, 1921, he recorded that certain rods which he had observed within cancer cells were anaerobic bacilli of the diphtheroid group of micro-organisms. Further, he brought forward evidence to show that the continued proliferation of the epithelial cells was due to the action of these bacteria.

As stated in the paper there are, at least, four distinct methods by which the validity of this hypothesis might be tested: 1. Direct microscopic examination of cancer cells. The rods were demonstrated many years ago (THE LANCET, Jan. 28th, 1908) by my father's palladium methyl-violet method; they occur chiefly within the nucleus and the infected cells occur in special areas; throughout the greater part of the tumour it may be impossible to observe any of these rods. 2. Artificial cultivation of the supposed bacteria. The evidence of this kind obtained up to the time at which the paper was published, as pointed out by the author, was, "perhaps not so decisive as that of the other three methods," but was sufficiently striking. He had isolated anaerobic bacilli of the diphtheroid group from eight carcinomata of the breast. It is to fill up this gap in the evidence then put forward that the present research has been undertaken. 3. The experimental production of cancer. Either pure cultures of the anaerobic diphtheroid bacillus, or of cultures of this micro-organism, together with cultures of a staphylococcus obtained from the human cases investigated, were inoculated into mice. Carcinomata were produced in one series of cases, positive results being obtained in all (100 per cent.) of five mice inoculated by the anaerobic diphtheroid bacillus and a mannite non-fermenting staphylococcus obtained from the same human case of adeno-carcinoma of mamma. In this experimental work it was recorded that micro-organisms obtained from a cancerous growth in the human subject produced cancerous growths, primary, in various organs (kidney, pancreas, uterus, &c.) of the different mice inoculated. 4. Focal reaction and therapeutic immunisation. Several cases of human carcinomata were recorded in which definite focal and general reactions occurred after inoculation with a vaccine prepared from the diphtheroid bacillus. Of certain of these cases, after such vaccine treatment, the neoplasms had decreased in size, the pain and discomfort from the growth were greatly diminished. One case of recurrence after operation was treated, the recurrent growths disappeared, and, at the present time of writing (July, 1923), the patient is still alive, active, and able to pursue his occupation, that of a labouring man.

To complete the cultural evidence it was obvious that a modification of the methods employed up to the date of the paper at the end of 1921 was necessary. Dr. Ford Robertson introduced into his technique the de-aeration of pure sheep's serum and, also, of de-aerated hæmoglobin serum glucose agar medium.

Before the value of these media could be tested thoroughly Dr. Ford Robertson was taken ill, and the work was carried on by me. The present paper is a record of this work.

Throughout my investigation I was in constant personal communication with my father, and, as a result of my work, both cultural and therapeutic, he requested me, shortly before he died, to state that he was convinced that the cause of and a cure for cancer

[1] An obituary notice of Dr. W. Ford Robertson appeared in THE LANCET of July 28th.—ED. L.
[2] THE LANCET, 1921, ii., 335; Brit. Med. Jour., 1921, ii., 929.

had been discovered. The laboratory findings recorded in the present publication were demonstrated in the Section of Pathology and Bacteriology at the recent annual meeting of the British Medical Association.

Preparation of Media.

1. *Preparation of De-Aerated Sheep Serum (D.A.S. Medium).*—For many years Dr. W. Ford Robertson kept a small flock of sheep solely for the purpose of obtaining blood or serum. A large hollow needle having been sterilised in boiling vaseline, the excess of vaseline is shaken out, and the needle is transferred to a sterile test-tube which is plugged. The sheep is placed and secured on a trestle sufficiently high to keep the feet off the ground. The side of the neck is clipped, lathered, and shaved. The wool around the shaved part is soaked with a solution of carbolic acid and the shaved skin cleansed with 1 : 50 (about) carbolic acid. The external jugular vein is made to stand out prominently by pressure applied to the lower end. The large sterile needle is inserted into the vein at its upper end, and the blood is allowed to flow through the needle into 6 in. by 1 in. test-tubes, about 40 c.cm. of blood being collected in each tube. Twelve tubes are taken at each bleeding. The blood is allowed to stand for not more than 24 hours, and then the serum is pipetted or drained off. Any tube in which the serum is cloudy and showing a scum on the surface is discarded (*Bacillus subtilis* is the most frequent contamination found). Some of the tubes occasionally have shown a fatty layer floating on the surface of the serum after 24 hours. This is thick and creamy in character, being quite distinct from the cloud and scum produced by *B. subtilis*. After decanting the serum into sterile test-tubes of ordinary size (5 in. by ½ in.), each of which is half filled, the fatty substance may continue to appear. As many as four centrifugings have had to be done in order to clear the serum. The centrifuged deposits have been microscopically examined and proved to consist of fat globules, all inoculations from these deposits on to hæmoglobin agar, &c., have proved them to be entirely free from micro-organisms. The ordinary tubes are plugged lightly and then transferred to an air-tight bottle attached to a Geryk pump. Air is exhausted until the serum begins to froth, further air being extracted when this frothing has ceased. The process is repeated every 15 minutes throughout the day. The tubes are incubated in vacuo until required for use, a periodical examination being made for the presence of cloud or marked deposit. Any so affected are centrifuged and tested for sterility. If the serum remains clear from the beginning, contamination rarely occurs later if care is taken with the plugging before storage. The presence of the fat, however, may give a little trouble, but this merely requires the serum to be centrifuged and the clear fluid decanted into a fresh sterile tube. In some cases it has been found useful to acidify the de-aerated serum by bubbling CO_2 gas through it for five minutes (D.A.S. + CO_2). When required for use the de-aerated sheep serum is decanted into small tubes measuring 2 in. by ½ in., which are sealed with corks soaked with boiling paraffin wax.

2. *Preparation of De-Aerated Hæmoglobin Serum Glucose Agar (Glucose Agar + 12).*—After pouring off the serum from the blood in the large tubes as described above, the blood-clot is allowed to stand for a further 48 hours. To produce lysis of the corpuscles the tubes are kept overnight in a freezing mixture of salt and water, after which they are warmed up in a basin of water at 60° C. for 10 minutes. They are then kept 24 hours before decanting into large sterile tubes. The hæmoglobin serum is then de-aerated by the same method as described for de-aeration of the pure serum. Freshly sterilised agar, in a test-tube of ordinary size, is cooled down to about 70° C., and a few drops of the de-aerated hæmoglobin serum are added and mixed. The tubes are sloped and the contents allowed to solidify. A sterile cotton-wool plug, half an inch in length, is pushed down to just above the upper limit of the agar. A small amount of pyrogallic acid is shaken on to the top of the plug, a few drops of sodium hydroxide solution (10 per cent. in water) are added, and the test-tube is sealed by a cork soaked in boiling paraffin wax. The tubes are incubated at 37° C. for 24 hours to test their sterility, and are then stored for use. The glucose agar is made according to the technique given in "Therapeutic Immunisation in Asylum and General Practice," by W. Ford Robertson, Chap. V., "Bacteriological Methods." The acidity of the agar is + 12.

3. *Other Media Used.*—Other media used have been made according to the instructions contained in "Therapeutic Immunisation in Asylum and General Practice" referred to above. In some cases Dorset egg medium has been made with the addition of de-aerated hæmoglobin serum, and has proved a valuable medium in the research. In several instances, to obtain the earlier subcultures, Dorset egg medium was necessary.

Technique for Inoculation of Media.—A small cube of about ¼ in. square is cut out with strict aseptic precautions from the deeper margin of a neoplasm removed at operation. Culture must be made not later than 8 to 12 hours after operation. With lymphatic glands containing metastatic growths the whole gland may be used if small enough. The cube removed is cut up into small portions of such size as to be capable of insertion into the 2 in. by ½ in. test-tubes. (*a*) One of these portions of tissue is pushed down with a sterile glass rod into each of two D.A.S. tubes and into two D.A.S. + CO_2 tubes until it is just below the surface of the medium. The paraffin cork is re-heated and re-inserted. The tubes are then incubated at 37° C. (*b*) The remaining pieces of the tissue are cut up into small fragments and placed in a strong test-tube containing ¼ inch of sterile ground glass. About ¼ in. of sterile normal saline solution is added and the whole ground up by a sterile glass rod. A few loopfuls of this solution are used to inoculate the following media: (1) One or two tubes containing "glucose agar + 12" medium and rendered anaerobic by the pyrogallic acid method (see above). (2) One tube containing Dorset egg medium; after inoculation the air is displaced by CO_2 gas and the tube is sealed with a plug of wool soaked in hot paraffin. (3) Instead of tube (4) in some cases Dorset egg medium, to which had been added de-aerated hæmoglobin serum (see above) is used. After inoculation the air is displaced by CO_2. (5) Two tubes containing ordinary hæmoglobin agar + 18. One of the tubes is rendered anaerobic by the pyrogallic method, the other being incubated anaerobically. (6) One tube containing ordinary lactose serum agar incubated aerobically. All these tubes were incubated at 37° C.

Addendum on Technique.—Recently a modification of the cultural technique has been employed which has proved of great use in making early subcultures and in dealing with weekly growing strains of the anaerobic diphtheroid bacillus. This technique was devised to bridge over the gap existing between the fluid D.A.S. and D.A.S. + CO_2 media and the comparatively dry condition of the surface media in the glucose agar + 12 tubes, the transition from one to the other being too sharp. A small amount of D.A.S. was poured into a tube containing glucose agar + 12 medium sufficient to form a layer 1 mm. thick and allowed to collect at the bottom. The surface of the tube was then inoculated with a loopful or more of the deposit. A small sterile plug was next inserted and pushed down a short distance from the upper limit of the medium. On this plug a layer of ¼ in. finely powdered calcium chloride was dropped, which was covered by another sterile wool plug ¼ in. in thickness. On this plug a thin layer of pyrogallic acid was laid, and a few drops of sodium hydroxide (10 per cent. sol.) was added. The mouth of the tube was then sealed with a cork previously soaked in boiling paraffin wax. The tube is now laid flat, so that the serum formed an even layer over the medium, the whole being incubated for 36 hours. After this time the calcium chloride has absorbed all the water from the

serum and a dry or sticky surface is left. The tube can be incubated in a vertical position. This method has been found valuable also in increasing the vigour of pure anaerobic growths after prolonged subculture and incubation. Three different strains of anaerobic diphtheroids from separate cases have been restored to vigour by this means.

Examination of Culture Media.

All the inoculated tubes (1) to (6) inclusive in the previous paragraphs were examined for growth after 24 to 48 hours' incubation. Those tubes showing no visible growth, or only a sparse growth, were replaced in the incubator. From those tubes in which there was a copious growth, films were made and stained by Gram-neutral red method and examined microscopically. A note was made as to the group of micro-organisms (streptococci, staphylococci, &c.) present, but no further investigation of these was made except in those particular instances in which subsequent examination of the anaerobic diphtheroid bacillus, subcultured from the D.A.S. culture, showed micro-organisms resembling somewhat streptococcal forms. In such cases any streptococcal colonies and suspected diphtheroid colonies were subjected to a series of biochemical tests to differentiate the species (lactose, mannite, salicin, and lactose serum broth).

With reference to the D.A.S. and D.A.S.+CO_2 tubes it was found that the time required for primary incubation varied according to the malignancy of the neoplasm. The more malignant the tumour, the shorter the time required before examination. For example, in the case of a rapidly growing epithelioma, the anaerobic diphtheroid bacillus was found in enormous numbers after four days' incubation at 37° C., whereas, in an atrophic scirrhus, after one week's incubation at 37° C., comparatively few diphtheroid bacilli were present. In some cases the serum in the tubes became cloudy owing to the presence of streptococci, but these tubes, as well as those in which the serum remained clear, showed a white deposit varying greatly in amount. A loopful of the deposit, or if the latter was copious, a little removed in a capillary tube, was used to make a thin film. It was found better to dilute the serum on the slide with distilled water, to avoid too deep staining of the background. The film was stained by Gram neutral red. As in any film containing serum, decolorisation by alcohol was continued only until the violet stain ceased to stream away. If an attempt was made to decolorise the background completely all the micro-organisms on the film would naturally be decolorised. Further, the gentian-violet solution was filtered on to the preparation. It was found that the white deposit consisted of bacteria and disintegrated tissue. Often partially disintegrated epithelial cells were seen. The background consisted of a very finely granular field which should not be mistaken for micro-organisms and is present in films made of uninoculated serum. The amount of white deposit was found to have a relationship to the numbers of micro-organisms present other than the anaerobic diphtheroid bacillus. The greater the number of streptococci, staphylococci, &c., present, the larger the deposit. The growth was then subcultured from the primary growth in D.A.S. and D.A.S.+CO_2 media. The white deposit in the primary D.A.S. and D.A.S.+CO_2 culture was used to inoculate the Dorset egg+CO_2 medium and G.Ag+12. Two tubes of each of these media were used. These subculture tubes were incubated at 37° C. The colonies of the diphtheroid bacillus were visible on the egg medium after three to seven days, but, owing to delay in examination, consequent on the large number of tubes dealt with, the colonies had, in some cases, become quite large when first examined. Further subcultures were made to obtain the anaerobic diphtheroid bacillus in pure growth. The media used for these subcultures were either Dorset egg medium+CO_2 or glucose agar + 12 according to the medium on which the first subculture of the particular strain had grown best. For study of characteristics of colonies and picking of them off for pure subcultures, a strong hand-lens was used with double-jointed movable spring clip. The clip attaches the lens to the tube, thereby allowing the apparatus to be slipped along the tube and focused easily on any particular colony. The tube with clip attached is held in the left hand, and the platinum needle is inserted and a colony picked off under the lens.

Cultural Characters and Morphology of the Anaerobic Diphtheroid Bacillus.

In pure cultures on Dorset egg medium + CO_2, to which a few drops of alcoholic solution of basic fuchsin have been added, after 24 to 48 hours the colonies, as seen through a strong hand-lens, appeared as minute rounded, semi-transparent, white or pinkish growths. In those cases in which the colonies were pinkish the colour was due to the bacilli having taken up the stain, as when removed by the platinum needle the colony on the needle showed the pinkish coloration. The colonies were soft and slightly sticky, except in one case in which the culture was first examined after six days, and showed soft colonies and colonies which were granite-like and very difficult to break up.

In pure culture on glucose agar + 12, after 24 to 48 hours, the colonies as seen under a strong hand-lens, appeared as minute round transparent moist colonies. Subsequently as they increased in size they became semi-transparent and later yellow or greenish-yellow, while the medium became cloudy and dirty brown. Again, other species took on a pink coloration, with very little change in the medium. After about two weeks' incubation at 37° C. the colonies were the same dirty-brown colour as the medium.

Films of the anaerobic diphtheroid bacillus made from cultures show it to be an incompletely Gram-fast rod. In de-aerated serum the micro-organism occurs singly and in clumps, its length varying from 0·5 to 2 microns, its breadth being 0·2 micron. On Dorset egg medium + CO_2 and on glucose agar + 12 the micro-organism frequently shows pleomorphism. Numerous short coccoid forms occur, these being found sometimes in chains of five or six elements. The elements forming the chains are connected by a faintly staining filamentous sheath. Small rods in short-chain formation, with or without connecting filamentous sheath, occur. Some strains are uniformly longer rods 1·5 to 2 microns in length; curved and V-shaped forms are seen also. Other strains are uniformly short, being 1 micron in length. Bacilli with a thick club-shaped extremity and bacilli with a bulbous centre occur occasionally, especially in old cultures.

Material Examined.

The series examined in the present research consists of 15 cases of malignant disease. It comprises six cases of adeno-carcinoma of the mamma, three being scirrhus and three being encephaloid in type: One case of primary liver-celled carcinoma and the discharge from the wound after operation, one case of squamous-celled carcinoma, metastatic in submaxillary lymphatic gland, the primary neoplasm being from the lower lip; one case of carcinoma of the maxillary sinus; one case of sarcoma of the maxilla; one case of adeno-carcinoma of rectum; one case of adeno-carcinoma of the ovary, papilliferous in type; one case of squamous-celled carcinoma of cheek; one case of squamous-celled carcinoma of glans penis; swab from squamous-celled carcinoma of the cheek. From all these 15 cases the anaerobic diphtheroid bacillus has been demonstrated in cultures. In seven cases the bacillus was obtained subsequently in pure cultures in sufficient quantity for vaccines to be prepared and used therapeutically. The results obtained by this vaccine treatment will be published later. In all 15 cases a mannite non-fermenting staphylococcus was isolated, and in about two-thirds of the series streptococci were present also. In nearly every instance these staphylococci and streptococci were obtained only in anaerobic cultures. Two control cases were examined. In one case subcutaneous fat, and, in the other case, muscle of patients who were not the subject of malignant disease, gave negative results for the anaerobic diphtheroid bacillus.

I wish to express my gratitude to the various surgeons in Edinburgh and in Dunfermline, who have supplied me with material for this investigation, and especially to Mr. George Chiene and to Mr. Pirie Watson, who have given me every facility for carrying out the work. I am indebted also to Mr. Becker for his great kindness in helping me to collect the material, and to Dr. Batty Tuke for the interest he has shown and the encouragement he has given me.

Reviews and Notices of Books.

HEREDITY AND EUGENICS.

By R. R. GATES, Ph.D., Professor of Botany in the University of London. London: Constable and Co. 1923. Pp. 288. 21*s*.

THIS entertaining book should be closely read by all who are interested in human inheritance, especially if they approach the subject with the idea of doing something to make man better than he is. After a general introduction the author gives a pretty full account of what is known about the inheritance of abnormalities in man, a long discussion on twins and their resemblances, and concludes with a survey of the mass of questions involved in "eugenics" and "population." There is a good bibliography of books and papers. Two conclusions come out particularly prominently.

In the first place, it is plain that there are many doors of human inheritance which the key of Mendelism in its simplest form will not unlock, and when Mendelism passes on to reversed dominance, multiple factors, and such like, the practical sociologist may well feel that the problem is more difficult than he thought it was. It is well that he should do so, for there has been much easy talk in recent years of the possibility of the regeneration of man if only geneticists could have their way. Left-handedness, for example, was originally found to be a simple Mendelian recessive character. More recent investigation has, however, suggested that the mode of inheritance is not altogether clear, and that right- and left-handedness are not alternative characters but in their most marked forms the ends of a series with a large number of intermediate gradations—i.e., that many factors are involved. In the second place, one is impressed by the fact that even if the modes of inheritance of undesirable and desirable human qualities were known, it would be by no means an easy matter to eradicate or cultivate them unless the character in question is a simple dominant with a single factor. There is no particular reason for abolishing bradydactyly, but as it is a simple dominant character it could be kept under by preventing anyone who showed it from breeding and keeping a close watch for its possible reappearance de novo.

But musical ability and feeble-mindedness are recessive characters, and when the homozygous have been mated together or sterilised as may be appropriate the human breeder has still to deal with the heterozygous individuals who are carrying but not showing the character. It is reckoned, for example, that in the United States about 3 per 1000 of the population are mentally defective, and that at least 70 per 1000 are carrying mental deficiency as a recessive character. If the former mate together there is a certainty of defective children; if two of the latter happen to marry—and the chance is obviously not a very small one, even if cousin matings are barred—a quarter of their offspring will be defective. As Prof. R. C. Punnett has pointed out, it would take some 250 generations, or about 8000 years, to reduce the feeble-minded from 3 per 1000 to 1 per 100,000 by simply segregating or sterilising those who show the character. And when it comes to characters which are not single factors, the complications seem almost insuperable. Truly it seems sometimes that the function of natural knowledge is to explain why things are as they are without giving us any easy way by which to make them better. No doubt in the end it will be possible to do a good deal, but the time for action on a large scale has certainly not arrived yet.

An interesting discussion of the effects of racial interbreeding points out that in fact very few detailed studies have been made; such information as there is suggests strongly that the miscegenation of races which are far apart in the scale of social and intellectual development or markedly dissimilar physically is likely to give results which are in general bad, owing to a disharmonious mixture in the offspring violating the unity and wholeness which are characteristic of a perfect individual. The colour question needs clear thinking in all its aspects; it appears that facts to think about are wanted even more. Many of the qualities which future generations will value most highly may well be recessive.

HERNIA AND ITS RADICAL CURE.

By J. HUTCHINSON, F.R.C.S. Eng., Consulting Surgeon, London Hospital. Oxford Medical Publications. London: Henry Frowde and Hodder and Stoughton. 1923. Pp. 264. 12*s*. 6*d*.

THE frequency with which operations for hernia are nowadays performed has led to the difficulties being sometimes under-estimated, and we must admit that a few years ago hernia operations on soldiers were followed in too many cases by recurrence and other complications that could have been avoided by more careful and accurate methods. Mr. Hutchinson's book is therefore doubly welcome, for from the fruits of a wide experience he has made it his aim to give a practical account of hernia and the best methods for its radical cure. Many of the technical details that the author describes have been originated by himself, and while his methods are mainly in accordance with those used by the majority of British surgeons, he describes fully the less orthodox methods of others; in this way a thoroughly up-to-date account has been produced, and comparisons of various procedures are made in a fair and broad-minded spirit.

Mr. Hutchinson does not hold the view that the majority of inguinal hernias have a congenital origin, and he considers that nearly all umbilical and femoral hernias are acquired. A full and valuable account is given of the contents of hernial sacs, and special interest attaches to the sections on hernia of the vermiform appendix and of the urinary bladder, and on the various forms of fatty hernia. In inguinal hernia, where there is a well-developed conjoined tendon, the author sutures this tendon in front of the cord to the external oblique just above Poupart's ligament, thus allowing the cord to remain in its normal bed formed by that ligament; if the conjoined tendon is poorly developed Halsted's operation is preferred. The difficulties and dangers of operation for recurrent inguinal hernia are dealt with and, many exceptions being admitted, the general rule is laid down that it is better not to operate again where a suitable truss effectively controls a recurrent inguinal hernia. For imperfect descent of the testicle early operation is advocated, the testicle being brought down to the scrotum; the means of keeping it there are indicated. In femoral hernia the author is accustomed to operate from below and to suture Poupart's ligament to the pectineus fascia, but he also describes and discusses fairly Lotheisen's method that has become popular among so many other surgeons. For umbilical hernia Mr. Hutchinson describes his own method of closing the abdominal wall by two rows of sutures, the first a layer of mattress stitches taking tension off the second row. He is a firm advocate of the use of kangaroo tendon sutures, and he brings forward evidence to show that these are not absorbed but become incorporated in the body as firm fibrous tissue, with considerable advantages over catgut on the one hand, and such substances as silk and silkworm gut, which persist as foreign bodies. Metal filigrees are condemned and the author's opinions are confirmed by the increasing rarity with which such materials have been employed in recent years. The

diagnosis and treatment of strangulation are well described; where resection is necessary Mr. Hutchinson advises delivery of the bowel through a separate abdominal incision and he is in favour of end-to-end anastomosis.

The interest and value of the book are enhanced by the frequent descriptions of unusual cases and the numerous references to recent literature; its size has been limited by the omission of such details of anatomy, differential diagnosis, and treatment by trusses as have received full attention in many text-books; instead, the author has devoted himself primarily to a detailed account of the operative measures which in his large experience he has found suitable to all the different forms of hernia. As he writes clearly and his technical descriptions are easy to follow and well illustrated by diagrams, Mr. Hutchinson has fulfilled his object of producing a book of value to surgeons on a subject of considerable importance to the community.

THE MECHANISM OF FACIAL EXPRESSION.

Der Gesichtsausdruck und seine Bahnen, beim Gesunden und Kranken besonders beim Geisteskranken. By Prof. Dr. THEODOR KIRCHHOFF in Schleswig. Berlin: Julius Springer. 1922. With 68 illustrations. Pp. 227. 9*s*.

THE clinical part of this interesting monograph is peculiarly full and detailed; that dealing with pathological physiology is somewhat unsatisfactory. Prof. Kirchhoff apparently accepts without criticism the view that a second (non-pyramidal) facial path exists, extending from the cortex to the thalamus and from the latter ganglion to the nucleus ruber and so by rubro-pontine paths to the facial nucleus. This "affektbahn," however, is, to say the least, problematical. Many difficulties connected with the assigning to the optic thalamus of the function of emotional expression are not, we consider, sufficiently tackled by the author, who relies largely on observations now somewhat old, and does not, in our opinion, meet successfully the objections raised by Roussy to a thalamic localisation for emotional play of feature. The monograph is none the less instructive and readable, and supplies in convenient compass a great deal of clinical material of interest both to psychiatrist and neurologist.

THE CORNEO-SCLERAL DOME.

La calotte cornéo-scleral. By Dr. F. TERRIEN, Ophthalmologist to the Beaujon Hospital, Paris. With 144 figures. Paris: Masson et Cie. 1923. Pp. 260. Fr.25.

THIS treatise appears as one of a series entitled "Sémiologie Oculaire." The same author has previously written a work on the surgery of the eye and its annexes, and in attempting to deal solely with the anatomy, physiology, and pathology of the anterior part of the globe has set himself a somewhat thankless task. As far as conjunctival infections go, they can, it is true, be dealt with satisfactorily without reference to the rest of the eye, and this is perhaps also true of superficial affections of the cornea. Interstitial keratitis, however, may or may not be attended by inflammation of the iris and choroid, and the sign popularly known as "keratitis punctata" is always the result of a cyclitis. Again, penetrating wounds of the cornea involve the possibility of prolapse of the iris, of traumatic cataract, and of the presence of a foreign body in the globe. All this necessitates considerations which go far deeper than the corneo-scleral dome, and accordingly, in this treatise, we have the radiographic diagnosis of foreign bodies and the methods of their extraction by the giant, and by the small electro-magnet. Similarly, the proper treatment of serpiginous ulcer of the cornea cannot be carried out without a knowledge of the bacteriology and surgery of the lacrymal sac. These facts are not ignored, but they are perhaps hardly given their due weight in this book. Looking for compensating advantages in Dr. Terrien's method of approaching his subject, we find a useful description of the examination of the cornea in the living subject by the corneal microscope and slit lamp, and an excellent figure showing the magnified vessels, both blood and lymph, of the limbus. The bulk of the book, however, resembles chapters out of an ordinary text-book. Terrien can write most interestingly of his own original observations, as in his book on oculo-orbital sequelæ, but in this book the advantages over the average full text-book are not very apparent.

INFLAMMATION OF BONES AND JOINTS.

By LEONARD W. ELY, M.D., Associate Professor of Surgery, Stanford University. London and Philadelphia: J. B. Lippincott Co. 1923. Pp. 433. 30*s*.

THE treatment of diseases of joints has advanced but little of recent years, so that we turn to a monograph dealing with this branch of surgery with some interest. Prof. Ely's book treats of bone diseases as well as affections of joints. On the whole it is disappointing. In bulk it occupies considerably more space than is devoted to these subjects in the ordinary student's text-book of surgery, yet the reader will get little more help and information from it. Splints and apparatus are scarcely more than mentioned; there is no detailed description of their application. There is no account of the filling of bone cavities with pedicled muscular or with fat-grafts, nor do we find any reference to Wilms's method of treating septic joints. The author ascribes the localisation of bacteria in the ends of bones to the marrow in this situation being of a particular type, the lymphoid type, but he leaves only a vague impression as to what he really means by this. Speaking of the diagnosis of tuberculous joints, he points out that many non-tuberculous joint infections have on clinical grounds been regarded as due to the tubercle bacillus, and that such a diagnosis can only be established with certainty by the demonstration of the organisms in the joint fluid or synovial membrane. Prof. Ely's views on the influence of age upon the treatment of tuberculous joints are interesting and worth further investigation. He believes that this infection only attacks the synovial membrane and the lymphoid marrow of the bone-ends. Whilst it is possible to remove these two tissues in adults, it is quite impossible in children. Therefore, in adults resection should be the rule. Loss of joint function leads to disappearance of synovial membrane, a change in the marrow of the adjacent bones, and an inability of the disease to progress. He is satisfyingly frank about the results of our treatment in certain cases of chronic rheumatoid arthritis, stating that no known remedies can influence the course of the disease in the slightest. Admissions of this kind do much to stimulate the investigation of those hopeless diseases against which our present knowledge cannot prevail.

KALA-AZAR.

A Handbook for Students and Practitioners. By L. EVERARD NAPIER, M.R.C.S., L.R.C.P. Lond., in charge of Kala-azar Research, Calcutta School of Tropical Medicine; and ERNEST MUIR, M.D., F.R.C.S. Edin., of the Calcutta School of Tropical Medicine. London: Humphrey Milford. Oxford University Press. 1923. Pp. 160. 8*s*. 6*d*.

THIS handbook represents an elaboration by Dr. Napier of a somewhat similar, but smaller, volume written by Dr. Muir several years ago. The objects of the present volume are twofold: to record briefly and concisely the facts of the disease as at present known and to indicate the lines on which future research should be conducted, especially as regards the transmission of the disease. The three principal foci of the disease in India are Assam, Bengal, and Madras; on the other hand, Burmah, Ceylon, Bombay, the Punjab, and the N.W. Frontier Province have only recorded imported cases. To all intents and purposes, though the disease occurs in other parts of the tropics and subtropics, kala-azar is essentially an Indian disease, and its complete elucidation a matter of primary

importance to that country. This book, then, fulfils an admirable purpose in setting forth succinctly all that is known about the disease as it occurs in India. The section dealing with the pathology of the blood, describing the formaldehyde test, or the formol-gel reaction, which may be taken as absolutely diagnostic of kala-azar, is specially to be commended. Spleen puncture is regarded as a perfectly safe operation, we are glad to note, but there appears to be nothing to recommend sternum puncture as a means of investigating the bone-marrow with a view to diagnosis. The clinical descriptions and the methods of treatment are particularly complete and are, therefore, welcome to the sincere student of tropical medicine. While strongly advocating the specificity of antimony tartrate in this disease, the authors are careful to express the opinion that finality has by no means as yet been reached, and that the future is dependent upon investigations upon the pharmacology and biochemistry of the antimony salts. In regard to these aspects of treatment little, if any, investigation has as yet been attempted.

THE new edition of Delafield and Prudden's "Text-book on Pathology," reviewed last week in this column, is published in England by Messrs. John Bale, Sons and Danielsson, Ltd.

JOURNALS.

BRAIN. Vol. XLVI., Part 1.—On Certain Tonic or Postural Reflexes in Hemiplegia, with Special Reference to the so-called "Associated Movements," by F. M. R. Walshe. Continuing his brilliant researches into the phenomena of hemiplegia the author analyses a series of cases showing the so-called "associated movements." He concludes that they are tonic or postural reflex actions allied to the tonic neck and labyrinthine reflexes of Magnus and de Kleijn. They are best elicited by tonic voluntary activity of the normal limbs, and in these circumstances may be described, following Magnus's nomenclature, as "tonic reflexes arising in the limbs and acting on the limbs." The point illustrated by associated reactions, whatever their place of origin and seat of response, is that while the tone of a given muscle depends primarily and essentially upon the integrity of its own afferent supply, yet this tone is constantly influenced and modified by impulses arising in proprioceptive end-organs elsewhere in the body.—The Oculomotor Nucleus of Tarsius and Nycticebus, by John I. Hunter. They exhibit the presence of a central nucleus of Perlia which is smaller than in the anthropoidea. The Edinger-Westphal nucleus is in each case single; it is also concluded that relatively few optic fibres fail to cross in the optic chiasma. These differences from the anthropoidea are believed to indicate that stereoscopic vision has not yet been properly attained.—Lethargic Encephalitis and Herpes Febrilis, by Z. Szymanowski and Nathalie Zylberlast-Zand. By inoculation of the cornea of rabbits with material from the idiopathic herpes and from herpes associated with cerebro-spinal fever and scrofulosis the authors produce evidence to show that the pathological changes in the brain resulting therefrom are identical with those due to encephalitis lethargica. As a control other rabbits were inoculated with the virus of encephalitis lethargica itself. It is interesting to note that these observers found inflammatory changes in the liver in all their animals, whether inoculated with herpes or with encephalitis lethargica.—Dystrophia Myotonica (Myotonia Atrophica), by W. J. Adie and J. G. Greenfield. A brief review of the history of this disease is given together with a full description of an autopsy, believed to be the first to take place in this country, and a description of the disease based upon 20 cases observed by the authors. They conclude that dystrophia myotonica is a disease *sui generis* within the group of heredo-familial degenerative disorders. The fully developed disease is confined in the main to one generation (the dystrophic generation) where it occurs in some members of a number of families of the same child-rank to a common ancestor. In this generation some members remain healthy, some may have cataract alone, some may suffer from the disease in an incomplete form; whilst others present the combination of muscular atrophy and myotonia with certain extra-muscular symptoms for which the name dystrophia myotonica has hitherto been reserved.—Iron in the Brain, by A. Gans. A description is given of the various methods of obtaining the iron reaction in the brain together with some results obtained, with the object of directing attention to the importance of this promising method of research.

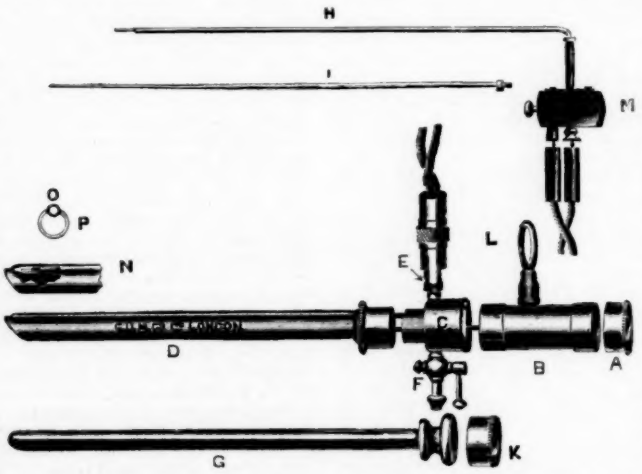
JOURNAL OF PATHOLOGY AND BACTERIOLOGY. Vol. XXVI., No. 3. July 1923. Pp. 305–432.—The Cultivation of Anaerobes in Auto-digest of Pancreas, by F. P. G. de Smidt. A medium made by incubating minced pancreas with chloroform for 24 hours gives free growth of anaerobes and other organisms and has a high concentration of amino-acids. Quantitative measurements of the relation of growth to reaction are given.—On Catalase in Bacteria and its Relation to Anaerobiosis, by A. B. Callow. Aerobes (except streptococci) have considerable amounts of catalase, anaerobes none. It is therefore possible that anaerobes fail to grow in the presence of oxygen because they are killed by the hydrogen peroxide which is then produced and not destroyed by catalase.—Bacterial Catalase, Anaerobes, and Oxygen, by J. W. McLeod and J. Gordon. In two papers the authors give much further information about the presence of catalase in and the production of hydrogen peroxide by a number of bacteria and suggest a classification based on these properties. In the presence of oxygen anaerobes produce hydrogen peroxide to which they are very sensitive. Ordinary media exposed to light are unsuitable for the growth of anaerobes and other organisms which are sensitive to peroxides owing to the development of traces of these substances in the medium.—Observations on Granules of Nucleolar Origin found in the Cells of Malignant Neoplasms during Mitosis, by H. A. Haig.—The Complement-fixation Test in Tuberculosis, by H. L. Coulthard. A thorough investigation of the various preparations of tubercle bacilli which have been used in the complement-fixation test leads the author to prefer simple suspensions of killed bacilli in saline. The reaction is highly specific, but is given by not more than 80 per cent. of cases of pulmonary tuberculosis and 50 per cent. of other forms. Acute infections generally give negative results and the strongest reactions are given by cases of chronic phthisis which are doing well; cases which are failing become weak or negative. The reaction therefore may be of some prognostic value.—The Glands of Internal Secretion in Experimental Avian Beri-beri, by V. Korenchevsky. Deprivation of vitamin B leads to hypertrophy of the adrenals, atrophy of the thymus, and atrophy of the splenic pulp; less constantly to activity of the thyroid, hypertrophy of the interstitial cells of the testis, and increase of the light cells of the pituitary.—The Influence of the Mother's Diet during Pregnancy and Lactation on the Growth, General Nourishment, and Skeleton of Young Rats, by V. Korenchevsky and M. Carr. Proper supplies of fat-soluble vitamin and calcium to the mother during pregnancy and lactation are most important for the welfare of the young.—Heteromorphosis (Metaplasia) of the Alimentary Tract, by G. W. Nicholson. The author describes gastric mucous membrane in a persistent vitelline duct, in Meckel's diverticulum, in a cyst of the pancreas, in inflamed gall-bladders, and in a tuberculous ulcer of colon. He points out that these abnormalities support an epigenetic mechanism of development and differentiation—i.e., environment determines which of the many potencies of cells shall be dominant.—Titration of Complement in the Wassermann Reaction, by F. C. Lewis. More delicate results are obtained by a finer gradation of quantities of complement than is generally used.—Bordet's Extract in the Wassermann Reaction, by H. D. Wright. Works as well as the more usual preparations, is stable and convenient.—A New Method of Decalcification, by C. Powell White. A solution of ammonium citrate, neutral or even alkaline, has no harmful effect

on the tissues and leaves the staining unaffected.—Method of Mounting Museum Specimens, by G. S. Williamson and I. H. Pearse. Labels on thin celluloid mounted in gelatin.—" Minute Bodies " in Two Cases of Epidemic Encephalitis, by C. Da Fano. A further account of the occurrence of the stainable particles, possibly parasites, previously described by the author.—Pneumococcal Endocarditis in Rabbits, by W. Mair.—The Effect of the Individual Host on the Virulence of Pneumococci, by C. H. Browning and R. Gulbrausen.—On *Bacillus coli anaerogenes*, by D. Nabarro. An account of the occurrence, variation, and serological reactions of a number of non-gas-forming strains.—The Origin of the Mononuclear Phagocytes of the Lung, by D. F. Cappell. The phagocytic cells of the alveoli are at first derived from special areas of the alveolar epithelium and in the later stages of irritation from the endothelial cells in the alveolar walls.—Modification of Victoria Blue Method of Auglade and Morel for Neuroglia Fibres in Frozen Sections, by J. Anderson.—An excellent photogravure of the late Prof. James Ritchie, for many years secretary of the Pathological Society and editor of the journal, is issued with the present number.

New Inventions.

A NEW URETHROSCOPE AND ITS USE AS A VAGINOSCOPE FOR THE TREATMENT OF VULVO-VAGINITIS IN CHILDREN.

THOSE who prefer a light urethroscope with the lamp at the end of the cannula may be interested in a new pattern, which has the advantages that the lamp-stem cannot obstruct the field of view; the lamp-bulb is in a recess and does not shine into the observer's eye; the operating attachment is very light, easy, and precise in action, and the instrument, with electro-cautery attached, weighs less than three ounces. The cannula, D, shown in the figure, has its end bevelled, and the lamp-stem is carried in a special tube in the long side of the cannula as shown at N, the bulb being very close to the end so that it lies in a recess and shines across the field. After removal of the introducer, G, the lamp, carried on C, is passed down the side-tube, shown in cross-section at O P; and the diagnostic eye-piece, K, is fitted into C, which has on one side the electrical switch, E, and on the other the bellows attachment, F. The operative attachment, B, is very simple. It consists of an outer cylinder with a longitudinal slot in one side, up and down which the handle of the instrument, L, can travel. In order to retain the air on inflation, the slot is covered by an internal cylinder fitting the outer one very closely. This internal cylinder has a short metal tube set in it at right angles to the long axis, so that it lies within the slot in the outer cylinder. Through the metal tube is passed the handle of the instrument, the stem of which is screw-threaded, as shown on I, so that it can be screwed into the head of the handle within the instrument. The whole is made airtight by a short piece of rubber tube, one end of which grasps the instrument handle and the other the tube through which this is passed. The electro-cautery is carried in the same way as the ordinary instrument and handle, the portion H being detachable from M, so that it can be passed up the inside of the operating attachment and fitted to the portion M, which carries the terminals and switch, and is fitted into the tube mentioned above in much the same manner as the ordinary instrument. A different eye-piece, A, is employed in the operative attachment, owing to the longer focus required. I have found the electro-cautery wonderfully convenient, as it is a very simple matter to bring the end into contact with any part required and then to turn on the current by pressing the button switch shown opposite to M in the diagram. This instrument with larger cannulas—namely, 28, 30, 32, and 34 F—is being used in the V.D. department at St. Thomas's Hospital for the treatment of vulvo-vaginitis in children. Evidence proves that one reason for the failure of ordinary methods of treatment of this troublesome complaint is that under the ordinary douching and swabbing which are usually employed the medicament does not reach infecting organisms in the fornices of the vagina.



The plan of treatment adopted, which has so far given very promising results, is to pass the largest cannula, with the introducer, which the hymen will allow. The introducer is removed, the lamp attachment inserted, and the vagina inspected under air inflation, as in ordinary urethroscopy. The view of the cervix and fornices which is obtained in this way is perfect. After this the outside of the cervix and the whole surface of the upper reaches of the vagina are painted with 25 per cent. mercurochrome 220. This can be done either by passing a dressed urethroscopic stick through the cannula after removing the eye-piece, or under air inflation by using the operating attachment and a dressed probe. Whichever method is chosen, the operation is not complete until every nook and cranny has been treated, as verified by inspection under air inflation. Care is taken that the dye does not reach down as far as the vulva in such strength: it will trickle down later, but will by then have become diluted. Naturally, the urethra and other infected parts must also be treated, but the method outlined above of insuring that every part of the vagina is reached by the chosen medicament seems rational, and the results have certainly been most encouraging. So far only mercurochrome has been tried; doubtless a large array of other drugs will suggest themselves to workers in this field.

The instrument has been made for me by the Genito-Urinary Manufacturing Co., 66, Margaret-street, London, W. 1.

L. W. HARRISON, D.S.O.,
St. Thomas's Hospital, S.E. Colonel, R.A.M.C. (ret.).

FROM the list of Birthday Honours which appeared in THE LANCET of June 9th was accidentally omitted the name of Lieut.-Colonel T. R. St.-Johnston, C.M.G., who was a medical officer in Fiji for over ten years, and is now Colonial Secretary of the Leeward Islands. His " South Sea Reminiscences " were recently reviewed in our columns.

Public Health Services.

REPORTS OF MEDICAL OFFICERS OF HEALTH.

THE following are some of the principal health statistics of a group of county and rural districts for 1922 :—

District.	Estimated (R.-G.) mid-year population.	Birth-rate.	Death-rates per 1000 of the population.				Death-rates per 1000 births.		
			All causes.	Tuberculosis.	Cancer.	Respiratory with influenza.	Infant mortality		Maternal mort. in childbirth.
							Legit.	Illegit.	
Hertfordshire ..	334,706	17·4	10·7	0·7	1·3	2·3	52	129	4·5
Herefordshire C.D.	50,523	20·4	15·4	1·2	1·1	3·2	56	93	2·0
West Gloucestershire C.D. ..	48,059	21·2	11·9	0·7	1·0	2·9	55	132	3·0
Dumfries County (landward) ..	43,808	24·0	14·3	1·0	1·2	1·9	—	—	3·8
Doncaster R.D.	27,300	29·9	12·2	1·1	0·9	2·3	93	222	4·8
Guildford R.D. .	20,090	17·5	11·4	0·7	1·5	1·5	33	111	0·0
Stockton R.D. .	15,150	25·0	10·6	0·3	0·8	2·6	91	222	2·6
Bridlington R.D.	8,154	18·6	12·0	0·4	1·0	1·9	32	136	6·8

C.D. = combined district. R.D. = rural district.

Hertfordshire.

Dr. H. Hyslop Thomson states that special efforts are made to deal with all open cases of tuberculosis in insanitary areas or in unhealthy or overcrowded houses. The opening of the County Sanatorium at Ware Park, with accommodation for 130, marks an important stage in the council's scheme. The absence of adequate accommodation for low-grade and complicated cases of mental defect is seriously felt from time to time. The need for a few efficient small-pox hospitals to take the place of the large number of existing small hospitals, many of which are of indifferent construction, is pointed out. Provision for the supply of diphtheria antitoxin is only made by about half of the 34 districts. The educational work of the "centres" has brought about a reduction in bottle-feeding, and the decline in notified cases of ophthalmia neonatorum is claimed to be the result of the use of colloidal silver by the midwives.

Dr. Thomson again complains of the dumps of imported refuse. The Ministry of Health has suggested rules to be observed by dumping authorities, but legislation will be needed to give the county council power to enforce these rules. One improvement has been brought about by the Ministry—namely, that railway wagons conveying refuse are required to be covered. The question is: Has any sanitary authority a right to create a dump for offensive refuse in the district of another sanitary authority, and has not sanitary science advanced sufficiently to enable us to say that these offensive refuse dumps are unnecessary? The purification of our rivers has cost money but has been worth it. We think the abolition of offensive refuse dumps will also be worth the cost.

Herefordshire.

Dr. Herbert Jones complains that the district councils do not take the water-supply of the houses in their districts seriously. About one-quarter of the cottage houses are supplied from sources at a distance and many dip wells which could be rendered safe are not rendered safe. It is also quite common to build a new cottage before ascertaining whether there is any suitable water-supply available. Dr. Jones has no sympathy with any occupier who complains that his pail closet is a nuisance. The remedy is in his own hands—viz., to see that a supply of earth is provided and used. There is a great improvement in the sanitary arrangements of the licensed houses. A few years ago it would have been difficult to find a house where one could recommend a fisherman or tourist to stay for a week-end. Now there are many comfortable country inns with sanitary conditions equal to those in towns.

Owing to the cost of repairs, routine house inspection has been in abeyance. Dr. Jones recommends that it be resumed. Thirty-six new houses were completed during the year. The accommodation for hop-pickers has been greatly improved in those districts in which by-laws are in force. Of the six rural districts in the combined district, one does not import hop-pickers but five do. Of the five councils of the districts which need to import hop-pickers, three have adopted by-laws but two have not. Dr. Jones points out that many of the hop-growers are anxious to make the pickers comfortable and that it is unfair to them that other growers do not "toe the line." The by-laws are not exacting, and one hopes that before the next report is issued the two reluctant rural district councils will have adopted them.

West Gloucestershire.

Surg.-Captain O. W. Andrews reports that the new reservoir on Ruardean Hill, the highest point in the Forest of Dean, has been completed, and that improved machinery for deep well pumping is being established at Greenbottom and will be ready for use next summer. Further extensions proposed will, it is hoped, provide a satisfactory supply for the whole of East Dean. An unusual incident is reported in the sudden disappearance of the water in three wells supplying the residents of Plump Hill Ward, East Dean. Earthquake disturbance could apparently be excluded, and it is suggested that the occurrence is due to the driving of an adit by an iron ore company under the area affected. There is a good spring in the neighbourhood, and it is suggested that this should be used to supply a ram capable of pumping the water to a reservoir on high ground, from which the whole district can be supplied at small cost. Dr. G. F. Rigden, the medical officer of the Cinderford Mothers' Club and Babies' Welcome, referring to industrial depression, says there are not an unusually large number of cases of malnutrition, but that he has been many times struck by the evident signs of under-nourishment in the mother of a well-nourished child.

Dumfries County.

Dr. J. Maxwell Ross reports that there were 936 legitimate and 116 illegitimate births in the County Landward. The mortality is not given for legitimate and illegitimate infants separately. The total rate per 1000 births was 85, the male rate being 97 and the female 71. Dr. Ross reviews the tuberculosis scheme; 27 shelters are available for use throughout the county. Sanatorium accommodation is very limited, especially for surgical tuberculosis cases, which need such prolonged treatment and for whom successful domiciliary treatment is impossible. The disposal of sewage by the burghs and special drainage districts is not yet satisfactory. In one case the difficulty is the cost to a village with a low rateable value. The pollution of the Nith by black water, apparently pumped from the coal-mines, and also by lead from Wanlockhead lead-mines has received attention. The question has arisen as to whether the former pollution can be dealt with under Section 5 of the Rivers Pollution Prevention Act, 1876.

Doncaster Rural.

Dr. A. B. Dunne reports marked building activity in five of the 37 parishes included in his district. The sinking of the shaft of the new colliery at Armthorpe has been actively carried on; 472 new dwelling-houses and bungalows have been completed during the year.

Guildford Rural.

Dr. R. W. C. Pierce reports a considerable prevalence of influenza in the early part of the year and that schools had to be closed for this cause. The new slaughter-house by-laws have come into force and

make provision for the humane method of slaughter. The 112 new houses completed during the year include 50 erected in Artington parish by Onslow Village, Ltd., now absorbed into the borough.

Stockton Rural.

Dr. Thomas J. Kirk reports a slight influenza epidemic in the last month of 1921 and the first month of 1922. The number of new houses completed during the year was 96, all by private enterprise.

Bridlington Rural.

Dr. William A. Wetwan reports that a few houses have been built but not enough to warrant turning out the occupants of 40 to 50 dilapidated dwellings and putting pressure on the owners of many more to bring them up to date. This is Dr. Wetwan's farewell report after 31 years' service, and he makes reference to the sanitary improvements which have taken place in the district during that period.

SCHOOL MEDICAL SERVICE.

Bristol.

LAST year 28,132 children were medically examined; 16,248 of these were routine, and 11,884 special inspections. Of the 1165 children suffering from enlarged tonsils and adenoids, 984 were recommended for treatment. 497 new cases were examined at the tuberculosis dispensary, and of these 57 were classified as definite pulmonary tuberculosis, 212 as cases of involvement of the hilar glands, &c., 20 as suspected tuberculosis, 208 as non-tuberculous. There were 295 cases of scabies, 2358 of impetigo, and 418 of ringworm of the scalp dealt with during the year; 183 of the ringworm cases were carried over from last year. Most of the 1050 cases of external eye disease occurred amongst debilitated children from the poorer homes. Attendances at school clinics during the year amounted to 172,487. A campaign was initiated in 1921 against verminous conditions. The coöperation of teachers, health visitors, infant welfare centres, schools for mothers, Sunday schools, boards of guardians was enlisted. Dr. R. A. Askins reports that a very great amount of good has resulted. He considers that if public interest can be kept stimulated in this problem we may soon see this evil reduced to such dimensions as to make its final extinction possible. Open-air classes are held in three city parks, each class accommodating 25 children. In wet weather the bandstands, protected by canvas wind-screens, are utilised, and the attendance at these classes rarely drops below 90 per cent.

Colchester.

The total number of children examined under the routine group was 2134, and 47·2 of these had defects requiring treatment or further observation; cases of uncleanliness or dental defects are not included. The number of children with defects is lower than that of the previous year, and Dr. W. F. Corfield observes that there appears to be only one reason to account for this—"the surplus of defects that had become chronic during the war and also the cases of malnutrition and debility resulting therefrom have now been overtaken, and the above figures are somewhat about a normal return." But surely the remarkable effect of the war on school statistics all over the country was the decrease in the number of cases of malnutrition and the feeding cases. The class for stammerers held last year has not yet been resumed, and the children returned to their ordinary schools. The teacher in charge of the class visited these schools and reported on the condition of the children. Of the 37 who attended the classes, two left the town and ten left school. The head teachers, with one exception, agreed as to the great improvement in speech effected by the classes, and an effort is made to keep up the practice of voice exercises. Of the 1580 children referred for treatment, 728, or less than half, actually received treatment.

At present little attempt is made to encourage parents to send or bring children to the dental clinic, as the dentist has his time fully occupied with those who come without such pressure. The medical officer suggests two methods by which this lack of interest could be stimulated: (1) the services of the dentist be secured for an extra half day a week; and (2) a dental dresser be employed to help the dentist. As it is, the dentist was employed on fewer occasions during 1922 than 1921, and we would suggest that in medical treatment of school-children, as in everything else, the demand creates the supply rather than vice versa. In this borough the demand appears to require energetic stimulating.

Swindon.

Altogether 3697 inspections were made. Of the 2673 children examined in the routine group, 45 suffered from malnutrition, 73 from defective hearing, 2 from otitis media, 55 from other ear affections, 13 from scabies, and 25 from speech defect. During the year there were 227 cases of ringworm, which has been prevalent in Swindon for many years. The work of stamping out this disease is now well in hand, and at the end of the year there were only 23 cases in an infectious condition, and every case was under treatment.

The prevalence of thyroid enlargement in Swindon led to the establishing of a clinic to deal with this affection, and Dr. Dunstan Brewer reports on the result of a year's treatment of those cases who were handicapped either by the appearance of the enlargement or by symptoms of disordered thyroid action. At first the cases were treated by simply painting the neck with tincture of iodine, and a definite improvement in these cases is recorded. On the assumption that the improvement was not due to any local action but to the absorption of iodine, a second batch of cases were painted under the armpits instead of on the neck. A more rapid improvement is recorded in such cases. A third batch was treated with iodide of potassium given internally with no apparent improvement of any description. Collosol iodine given internally proved to act better than any other treatment, and is now the standard method employed. The statement in the report that methods of treating stammering and similar defects of speech at present available in this country are of no practical utility, as they entail a cost which neither parents nor ratepayers are prepared to face, is surely inaccurate. We would refer Dr. Brewer to the six London County Council clinics for such treatment, which have been doing excellent work in this direction for the last two years, and can certainly not be called expensive.

THE PASTEURISATION OF MILK.
A REPORT BY THE MINISTRY OF HEALTH.

IN a recent report which constitutes one of the Ministry of Health series of reports on public health and medical subjects, Dr. J. M. Hamill[1] gives a brief account of the nature and object of pasteurisation, and the part which it may legitimately play in securing a safe and satisfactory milk-supply. His notes are also intended to serve as a guide to local authorities and others in respect of essential requirements in the design and construction of pasteurising appliances which should be complied with in order to satisfy the provisions of the Milk (Special Designations) Order, 1923, in regard to pasteurised milk.

Definition.

At the outset Dr. Hamill defines the object of the pasteurisation of milk as the destruction by heat of pathogenic organisms, and the reduction of the number of other organisms, especially those which cause milk to go sour, without appreciable alteration of the physical and chemical characters of the milk. When milk is heated to a relatively high temperature such, for instance, as 175° F. to 212° F. pathogenic

[1] Reports on Public Health and Medical Subjects. No. 17: Notes on the Pasteurisation of Milk. By J. M. Hamill, M.D., D.Sc., Medical Officer of the Ministry of Health. 1923. 2*d*.

organisms may or may not be destroyed, according to the actual temperature attained and the duration of exposure of the milk to it; in any case the physical and chemical properties of the milk undergo considerable alteration as a result of such treatment, and from a commercial point of view the quality and saleability of the milk is impaired. It is also possible that from a nutritive point of view such milk is less desirable than milk not so treated. Experience has shown that exposure of milk to a temperature between 145° F. and 150° F. for 30 minutes, if carried out with due attention to detail, destroys virtually any pathogenic organisms present in the milk without producing appreciable change in its physical and chemical characters. From the public health point of view, therefore, where milk is concerned, the term "pasteurisation" should be confined to the process of heating to not less than 145° F. and not more than 150° F. for a period of 30 minutes. Dr. Hamill uses the term strictly in this sense.

Effect of Pasteurisation on Bacterial Content of Milk and on its Chemical and Physical Characters.

Amongst the pathogenic organisms with which milk may be accidentally contaminated are *B. tuberculosis*, *B. diphtheriæ*, *B. dysentericus*, *B. typhosus* and other organisms of the typhoid-paratyphoid group. All the above organisms are destroyed by pasteurisation; the virus of foot-and-mouth disease is also destroyed, and although a small proportion of tubercle bacilli may, under certain conditions, escape actual destruction, their virulence appears to be so impaired as to make them harmless. Certain strains of streptococci may also survive pasteurisation, but the streptococci believed to be responsible for septic sore throat are destroyed by the process. Pasteurisation, therefore, renders milk reasonably safe as regards risk of transmitting disease. But apart from pathogenic bacteria milk always contains a number of non-pathogenic bacteria which gain access from the hands of milkers, from particles of manure, from dust and dirty utensils, &c. The number of these bacteria, quite apart from their pathogenicity, indicates the care bestowed upon its production and handling. Dirty milk is, of course, more likely to contain pathogenic bacteria. A proportion of the non-pathogenic bacteria are sporing organisms; amongst them are lactic acid bacteria which produce lactic acid during their growth and cause the souring of milk.

Pasteurisation does not destroy the whole of the non-pathogenic organisms in milk, but may reduce their number by as much as 99 per cent. As a general rule it may be said that the number of bacteria after pasteurisation is greater in milk which contained a large number of bacteria before pasteurisation than in milk which originally contained relatively few bacteria. Thus the bacterial content of pasteurised milk affords an indication of the bacterial condition of the milk before pasteurisation.

When milk is properly pasteurised the majority of its chemical and physical characters show no appreciable change. The taste and flavour are hardly if at all altered; alteration in the taste of the milk may depend, to some extent at any rate, upon exposure of the milk to air at the pasteurising temperature—in other words, oxidation may play a part in the change. If this be so the desirability of avoiding so far as possible exposure of milk to air during pasteurisation is obvious. If ordinary raw milk is allowed to stand, the cream gradually rises to the top and a line of demarcation, the "cream line," appears between the cream and the remainder of the milk. In milk pasteurised at 145° F. for 30 minutes the cream line is hardly if at all affected, but above that temperature the cream rises slowly and imperfectly, and in milk pasteurised at a temperature of 148° F. the cream line may be decreased by 40 per cent. From a commercial point of view the integrity of the cream line is important, because consumers are apt to look askance at milk in which the cream line is poor. In milk pasteurised at 145° F. for 30 minutes no appreciable change takes place in the milk proteins; if, however, the temperature is raised to 150° F. for 30 minutes a small proportion (about 5 per cent.) of the milk albumin is rendered insoluble. Coagulation by rennin occurs slightly more rapidly in pasteurised than in raw milk. The soluble calcium and magnesium phosphates of the milk do not become insoluble or separate out when milk is pasteurised at a temperature of 145° F. for 30 minutes. This treatment has, furthermore, only a slight effect upon the enzymes which are present in milk.

The effect of pasteurisation on the vitamins in milk is important. Milk is rich in fat-soluble A vitamin and also contains water-soluble B vitamin and the antiscorbutic vitamin (or C vitamin). Both fat-soluble A vitamin and water-soluble B vitamin have a relatively high resistance to heat, so that pasteurisation has practically no effect upon them. The antiscorbutic vitamin, however, is sensitive to heat above 122° F. and there seems to be little doubt that pasteurisation at 145° F. for 30 minutes weakens the antiscorbutic property of milk. The destruction of vitamins appears to be due to oxidation and is accelerated in the presence of air. Any precautions taken in pasteurisation to exclude air with the object of preventing changes in taste and flavour would also act beneficially in safeguarding the vitamins.

Some Considerations in Regard to Pasteurisation.

In general it is desirable that food should be consumed in its natural fresh condition whenever possible, but in densely populated areas the circumstances are often such that, unless perishable food like milk can have its keeping qualities improved by some process which does not appreciably alter its properties or impair its nutritive value, a proportion of the population will be forced to curtail or even do without a very important food.

An ideal milk-supply, obtained from perfectly healthy cows under the cleanest conditions and consumed immediately with the least possible manipulation or handling, is difficult of attainment. Milk of this high quality must necessarily be limited in amount and its cost precludes its use by the average consumer. As England is a highly urbanised country, much of the milk-supply has to be transported considerable distances, a circumstance unfavourable to its keeping qualities and often resulting in considerable loss of milk by souring. Pasteurisation may be regarded as a factor in the extension of the consumption of milk by urban dwellers, many of whom at the present time do not consume as much milk as they should. Pasteurised milk is, of course, just as liable to bacterial contamination as clean raw milk, and since it still contains some lactic acid producing organisms it will eventually go sour just as does clean raw milk. It is essential, therefore, that it should be thoroughly cooled immediately after pasteurisation and kept under good conditions until consumed.

It is sometimes asserted that bacteria grow faster in pasteurised than in raw milk. Experimental evidence, however, does not bear this out, but goes to show that the rate of bacterial increase is approximately the same in raw and pasteurised milk when comparison is made between milks having about the same bacterial content. It is also alleged that pasteurisation will not encourage farmers to exercise cleanliness in production of milk, and will enable dirty and stale milk, otherwise unfit for sale, to be placed on the market. But the keeping qualities of pasteurised clean milk are superior to those of dirty milk after pasteurisation. It is, of course, possible to prolong the life of pasteurised milk by repasteurisation, but this process would permit deviations from the normal to an extent which is undesirable.

It is occasionally stated that pasteurised milk does not agree with all children, but the same may be said of any milk; extensive experience of feeding children on pasteurised milk goes to show that it is as well borne by them as raw milk, and, except in regard to antiscorbutics, it appears to be equally nutritious.

Appliances Employed in Commercial Pasteurisation.

A pasteuriser should be moderate in cost, reliable, efficient, simple, compact, durable, easily kept clean, easily operated, and, in addition, continuous in action. A large variety of appliances continuous in action have been devised for commercial pasteurisation. They can conveniently be grouped into four categories or types.

1. "*Flash*" *Pasteurisers.*—"Flash" pasteurisation is a process in which the milk is very rapidly heated to a relatively high temperature and then cooled. In one type of flash pasteuriser the milk enters a hollow vertical cylinder at its lower end and by means of a rotating device is distributed by centrifugal force in a thin film over the inner surface of the cylinder and then leaves the cylinder at its upper end. The cylinder, and therefore the milk flowing over its inner surface, is heated by a combined water and steam jacket. The apparatus is continuous in action. This type of pasteuriser has many serious disadvantages. It is very difficult to maintain a uniform temperature, and the relatively small heating area makes it necessary to raise the temperature of the heating medium considerably higher than the temperature to which it is desired to raise the milk. This means overheating of portions of the milk and alteration of its character. Again, the milk is not retained sufficiently long at the pasteurising temperature and portions of the milk may not reach that temperature. It is impossible by means of a "flash" pasteuriser to ensure the definite results aimed at in pasteurisation.

2. "*Retarders.*"—The many varieties of design in this class of pasteuriser agree in the general principle of allowing the milk to pass through an apparatus so constructed as to delay or retard the flow of the milk and thus keep it at the pasteurising temperature for a prolonged period. All retarders are continuous in action. Retardation may be effected by various devices, such as compelling the milk to take a long course through a series of tubes or through chambers fitted with baffle plates. Where it is required that milk shall be exposed to the pasteurising temperature for 30 minutes the apparatus is so designed that a volume of milk equal to the capacity of the apparatus passes through it in that time.

Retarders possess many commercial advantages—simple design, close control of temperature, &c., but for complete destruction of pathogenic organisms retarders cannot be relied upon, as no retarding system yet designed is able to prevent a portion of the entering milk from passing through in less than the prescribed time.

3. "*Holder*" *Pasteurisers.*—The term "retarder" is sometimes used to describe pasteurisers of this class. It is desirable to restrict the term "retarder," however, to appliances of the type described above. The "holder" class of pasteuriser has for its object the elimination of the defect which retarders possess of allowing a portion of the milk which passes through them to escape too soon. It is the practice commercially to classify holder pasteurisers into two groups, according to whether the milk is heated in the holder itself or before entering the holder. The underlying principle of holding all the milk at a definite temperature for a definite time is the same in both groups. The simplest form of holder is a tank in which the milk is kept or "held" at 145–150° F. for 30 minutes and then cooled. Holders of this type having a capacity of 50 to 100 gallons are made for dairymen doing a limited trade in pasteurised milk. The holder is conveniently a cylindrical tank surrounded with a water jacket into which steam can be admitted to heat the milk, and an agitator is provided in the holder to facilitate the heating of the milk. The temperature in the jacket is raised slightly above the pasteurising temperature by the admission of steam into the water, and when the milk in the tank reaches the pasteurising temperature the steam is cut off and the milk kept in the holder for 30 minutes, when it is cooled by a flow of cold water through the jacket. Alternatively, the milk may be heated before admission to the holder and cooled in a separate cooler after being held at 145–150° F. for 30 minutes. This simple type of holder is effective, but is not continuous in action; for work on a large scale continuous action is a commercial necessity, and the simplest way in which this can be attained is by using three separate holding tanks of the same capacity. Milk is held in one tank at the pasteurising temperature for 30 minutes, whilst the second tank is being filled and the third emptied. The milk in the second tank is then held for 30 minutes whilst the first tank is being emptied and the third filled; in this way a continuous cycle of filling, holding, and emptying is achieved. The use of only three tanks, however, is open to the objection that some of the milk may be held for much longer than 30 minutes, and that one hour must elapse after the commencement of work before pasteurised milk can be obtained. These drawbacks can be minimised by increasing the number of tanks and so enabling the period of filling and emptying each to be diminished.

To enable the process of pasteurisation to be adequately controlled and supervised, it is desirable that all pasteurisers should be fitted with some form of automatic time-temperature recorder, whereby the temperature of the milk during the process of pasteurisation in relation to the time taken is continuously recorded on a chart. A permanent record of this kind is of value to the milk vendor and to those in charge of administration as a check on the proper working of the pasteuriser.

4. *Pasteurisation of Milk in Bottles.*—The advantages claimed for the pasteurisation of milk in air-tight stoppered bottles are that the milk cannot become contaminated after pasteurisation and before use, and that it keeps longer than milk pasteurised in bulk. An apparatus for pasteurising milk in bottles cannot be regarded as satisfactory unless it can readily comply with the following requirements. It must be possible to ensure that the milk reaches the pasteurising temperature and is not heated above this temperature (145–150° F.), and in addition, there must be practicable means for ascertaining definitely that the milk has been kept at the pasteurising temperature for 30 minutes.

As regards the first requirement, the temperature of the heating medium (usually water heated by steam) may be considerably above the pasteurising temperature, and there are obvious difficulties in making certain that the bottled milk, the temperature of which cannot be measured directly, has attained and not exceeded the pasteurising temperature. Similar considerations apply to the second requirement. It is not a simple matter to ascertain the period during which the milk has been kept at the pasteurising temperature in the case of milk in bottles, where direct temperature measurement is impossible. The matter is complicated by the period, not easily estimated, during which the temperature of the milk in the bottle lags behind that of the heating medium. In any particular apparatus this period of lag might be ascertained experimentally, and possibly an apparatus could be designed in which it would be small, but for purposes of control and supervision a method in which the period of exposure to the pasteurising temperature can only be determined indirectly is not so satisfactory as methods in which direct observation is possible. Uncertainty could be avoided by first heating the milk in bulk up to the pasteurising temperature, and then filling the bottles already heated to the same temperature and keeping them at that temperature in the pasteuriser for 30 minutes. This method would be similar in principle to that employed in the "holder" process for milk in bulk.

DONATIONS AND BEQUESTS.—The late MRS. Fredericke Mond, of Regent's Park, London, widow of DR. Ludwig Mond, left to all the charitable societies or institutions to which she had been an annual subscriber for at least two years before her death a legacy, free of duty, equal to the aggregate amount of her annual subscriptions for the last eight years.

THE LANCET.

LONDON: SATURDAY, AUGUST 18, 1923.

LONDON WATER.

THE Metropolitan Water Board supplies 35 gallons of water a day for the use of each of nearly seven million persons scattered over 537 square miles and six counties, water which is fit not only to wash and flush, but to drink; and this immense task is carried out with such apparent ease and regularity that the Londoner, when he travels, begins to realise for the first time that water may be scanty or brackish or insipid or discoloured. It was only during the great drought of 1921 that the inhabitants of the metropolis began to think seriously at all of their water-supply, and Sir ALEXANDER HOUSTON, director of water examination to the Board, in his seventeenth annual report just published,[1] endeavours to keep alive this new and wholesome interest by describing the wonders of London's water-supply in language as free from technicalities as is reasonably possible. The complete protection of London from water-borne disease is the more remarkable inasmuch as 80 per cent. of the water is drawn from two rivers which are undeniably polluted. Less than 20 per cent. comes from the deep wells in Kent and in the Lea valley, whose water is bright, clear and sparkling, and pleasant to taste, while its undoubted hardness is not prejudicial to health although prodigal of the use of soap. Its reputation for purity is almost a danger, apt, as it is, to create a feeling of implicit trust, and during the drought of 1921 the Deptford "twins" well fell off so greatly in quality as to require chlorination. Another well, that at Waltham Abbey, supplies water which, although very pure bacteriologically, contains iron and sulphuretted hydrogen, which need to be eliminated. Although London well water bears such a small proportion to the whole, we are reminded that it would abundantly supply a city of the size of Birmingham.

Pollution of the river water-supply is not a fixed or necessarily permanent quality. The Thames used to be a great salmon river, and might be so again were it not for the effluents draining into the tidal portion. Salmon could now thrive and spawn in the river above Teddington weir, although they cannot face the ordeal of ascending the lower reaches, and the upper Thames as it is possesses great powers of recuperation, for the surface water is constantly being replenished by underground springs, and during the summer months many of the existing pollutions cease to reach it direct. Investigations made 15 years ago showed the water at Hampton to be not greatly inferior to that 55 miles higher up, the difference being so slight as to suggest that in spite of fresh pollutions the river is not deteriorating to any progressively marked extent along its flow. Next year the total capacity of the Thames storage will be doubled on the completion of the great reservoir at Littleton. Storage is one of Nature's own methods of purification, by which not only do the solid impurities settle and chance pollutions become greatly diluted, but pathogenic bacteria gradually lose their vitality and die during the passage of water through the reservoirs. And these reservoirs are so enormous—taken together exceeding Ullswater in surface—that to all intents and purposes Londoners are really drinking lake water. Economy alone has led to the chlorination of raw Thames water in the aqueduct at Staines, by which a certain amount of additional pumping is avoided, and this chlorination has been carried out without giving rise to a single complaint of taste among the two million persons who drink it.

The Lea valley supply has peculiar interest, derived as it is largely from the New River, an artificial channel nearly 30 miles in length, with its intake safely above the Hertford sewage works. This rivulet is practically free from pollutions along its whole course, but has troubles of its own, for in the spring of each year abundant growths, chiefly of diatoms, develop to such an extent as to block the filters, and while such algicidal agents as chlorine or copper sulphate have been sometimes effective in the reservoirs, no panacea has yet been discovered for the prevention of algal troubles. New River water is continuously diluted as it flows with pure well water, and its volume would suffice to supply such a town as Liverpool or Manchester. Sir ALEXANDER HOUSTON is rightly proud of the results of the water examination which he directs, but his pæan of praise for the present supply is not, as he cannily remarks, to prejudice him in calling attention now or hereafter to any imperfections which may be found in the quality of the water. With whatever care and foresight, the water expert cannot discover all the hidden dangers to which a water-supply of this magnitude may be exposed. Safety lies in not introducing any new factor into waterworks procedure until it has the hall-mark of bacteriological approval, and in safeguarding the finally purified water against the entrance of impurities. The coöperation of the public is needed to achieve the second of these objects, and such a report as the one before us should help in forming and instructing public opinion. Let every good citizen read it.

[1] London: P. S. King and Son, Ltd., 2, Great Smith-street, Westminster. 15s.

THE TREATMENT OF INFECTIONS OF THE HANDS.

IT would have been difficult to select a subject of more general interest than the treatment of infections of the hand, which was discussed at the annual meeting of the British Medical Association at Portsmouth. For this reason we gave last week an unusually long report of this session of the Surgical Section. It is probably within the mark to state that five-sixths of the adult working population follow some calling for the proper performance of which the integrity of their hands is a necessity. The importance of skilful initial treatment when these infections occur can scarcely be overestimated, for although the loss of one finger in itself may not interfere seriously with a man's occupation, when such an amputation must be resorted to the inflammatory process has too frequently spread to the palm, with the result that the grip of the hand or the movements of the other fingers are seriously impaired. In some hospitals the treatment of these patients from time immemorial has been relegated to the junior staff. The outcome of this policy has been that little interest has been taken in improving therapeutic technique, and a generation of practitioners has grown up trained in methods which are now obsolete.

It was left to KANAVEL in America to reinvestigate this subject and to infuse new life into it. The results of his labour were finally embodied in a monograph which will assuredly remain a classic upon which future treatment will be based. Although much of KANAVEL'S work was published more than ten years ago, his teaching has not yet reached the majority of

general practitioners, so that we still see patients who have suffered from the commonest of all hand infections, that of the pulp of the finger, crippled by an ill-chosen median incision. Either there remains a scar too sensitive to pressure for use, or deforming scar-tissue has destroyed the delicate tactile sensibility of the pulp. Early lateral incisions are just as effective in checking the infective process without these drawbacks. The unsightly nails we still see after the healing of a whitlow result from delay in removing the nail and the unnecessary incision of the matrix. When the infection has reached the tendon sheath the prognosis as regards future mobility is rather poor, for the tendon is very likely to slough or form such adhesions that it becomes immovably fixed, whilst extension to an interphalangeal joint will almost certainly lead to a stiff finger. Here early lateral incisions are essential, but though they may pass with advantage through the subcutaneous tissue along the whole length of the finger, the sheath should only be opened opposite the shafts of the phalanges, or a troublesome prolapse of the flexor tendons will occur. The after-treatment of these thecal whitlows is exceedingly difficult and an issue with good movement is the exception rather than the rule. Sir HENRY GRAY'S recommendation that WILLEMS'S mobilisation treatment should be instituted from the first deserves attention. After the incision the patient must be encouraged, threatened, or cajoled into active movements whilst his hand remains in a bath of weak antiseptic or saline solution. Passive movements are wrong and do harm. Drainage by this method is good. Tubes, gauze, or rubber tissue drains are seldom necessary. The worst of all infections are those which travel up from the thumb or little finger to the anterior carpal sheath. The operative treatment of this condition is a major surgical procedure and should always be carried out very deliberately under general anæsthesia, with a tourniquet applied. The areas of infection must be reached by the proper anatomical route, injury to the nerves and vessels of the palm being sedulously avoided. Even with the greatest care, the infective process may spread to the fascial planes of the forearm, and the general condition of the patient be so grave that an amputation becomes the only life-saving operation.

Mr. D. P. D. WILKIE called attention to those streptococcal infections which show such a great tendency to generalisation. With a non-suppurative limited area of infection in the hand are associated a lymphangitis up the arm, an axillary adenitis, and septicæmic symptoms. Early incision is not indicated in this condition, the principles of treatment being to aid the general resistive powers of the body, encourage elimination, and locally to institute Bier's hyperæmia.

DOCTORS AND UNCERTIFIED MIDWIVES.

A CASE of some interest, decided earlier in the year but only lately appearing in the Law Reports, throws light on the amount of supervision which a doctor should exercise over a woman who acts as a midwife without being certificated. The Midwives Act of 1902 declares that, if a woman is not certified under the Act, she commits an offence punishable by fine if she "habitually and for gain" attends women in childbirth "otherwise than under the direction of a qualified medical practitioner." An exception is made for emergencies, but in the case to which we draw attention (DAVIS *v.* MORRIS, *Law Times Reports*, vol. cxxix., p. 88) there was no suggestion of an emergency. The facts were that five expectant mothers had engaged an uncertified midwife's services; qualified medical practitioners were also retained in each case, but they did not pay any professional visits until after the confinements which were attended by the woman alone. In these circumstances she was prosecuted under the section. The doctors who had been retained came and gave evidence on her behalf. They said she was in their opinion capable and trustworthy; they had given her no specific instructions; it was unnecessary to do so; she was acting, they said, under their direction in attending the confinements. The magistrates had to consider whether this was sufficient supervision under the Act, or whether "direction" did not mean special instructions suitable to the particular case. They came to the conclusion that no offence had been committed and they dismissed the prosecution. It turns out, however, that they were wrong. The Lord Chief Justice pointed out that in no case was there any professional visit by the doctor; in no case was there any professional inquiry or any specific instruction. There was thus no evidence on which the magistrates could find that there had been any direction at all. Direction must be real and not nominal. "The medical practitioner should accept more than the nominal responsibility for the case. He must make himself acquainted with the particular requirements of the patient. It is not enough that there should be a qualified figure-head in the background; the unqualified person must be acting under the real direction of a medical practitioner."

This judicial homily deals, we take it, not so much with the abstract standard of doctors' conduct as with the conditions necessary to be established in a court of law if an uncertified midwife is to be found not guilty of an offence against the Act. But as there is no statutory definition of "direction," the decision is valuable. It is only fair to add that the woman whose action was in question had formerly been a certified midwife, but her certificate had been withdrawn. In the eye of the law she may have been uncertified and unqualified, but the skill and experience which in time past had been sufficient to earn her certification were, doubtless, well known to the doctors under whom—if not under whose "direction"—she was serving.

ALTERATIONS OF VIRULENCE BY PASSAGE.

IT is commonly held—and on sound experimental grounds—that when a dose of many millions of bacteria is given to an animal the great majority of the organisms are soon killed and disposed of, and that fatal infection, if it occurs, is due to the survival and multiplication of the relatively infrequent individuals which are able to withstand the attempts of the animal to destroy them. If after the death of the first animal this new race of exalted virulence is inoculated into a second host a similar selection occurs, and so on through successive animals until the capacity of resisting the mammalian body, in other words the virulence, of the organism has by this selective breeding been developed to the highest possible degree. Whether the mean virulence of the race which is finally obtained is greater than that of the most virulent individual of the original inoculum is unknown, but if there is any such progress in absolute individual virulence selective breeding seems to be the basis of this pasteurian exaltation of virulence by passage. It seems likely, too, that the same process goes on during the course of a natural epidemic. Several experimental observations have, however, lately been made which indicate that this is not always the sequence of events.

Prof. C. H. BROWNING and Miss R. GULBRANSEN [1] noticed that very small doses of pneumococci, which

[1] Journal of Pathology and Bacteriology, 1923, xxvi., 122.

in large quantities were rapidly fatal, might set up a chronic pneumococcal septicæmia in mice lasting at least several weeks, during which time the organisms can hardly have been engaged in selective breeding for virulence. The results in this instance may have been due to the original dose having been only a small sample of the pneumococcus population which by random sampling did not happen to contain any highly virulent individuals. If that were the explanation, the experiment would not come off every time, for some of the samples would include the most virulent cocci. The same authors[2] later pointed out that the virulence of the pneumococci present in the heart's blood of a mouse dying within 48 hours of inoculation may be actually less than those inoculated into the animal, and they have recorded a similar loss of virulence in fatal infections of mice with tubercle bacilli. Dr. W. MAIR[3] also records some very significant observations. Rabbits received a prolonged course of inoculation with dead pneumococci and their serum protected mice against many fatal doses of live organisms. The animals then received doses of living pneumococci; after some months they deteriorated in general health, and on examination were found to have a pneumococcus septicæmia with extensive vegetations on the heart valves, reproducing broadly the picture of chronic infective endocarditis in man. The organisms isolated from the blood proved to have lost their virulence for rabbits and mice in the sense that large doses no longer caused acute death. Dr. F. GRIFFITH[4] has also shown that these results may be reproduced in vitro. By growing pneumococci in their own immune serum he finds that a fresh race develops with different cultural characters, resistant to agglutination (as in Dr. E. W. A. WALKER'S classical experiments with typhoid bacilli[5]), impotent as antigen, and with a marked loss of virulence. These modifications suggest that the organism has been selected into a form which to a large extent fails to interact with the host, which is "naturally" immune to it to a certain degree, and which will set up local changes only in such places as the avascular heart valves, where the normal mechanism of response and resistance is defective. It is of much interest in this connexion to recall that Sir THOMAS LEWIS and his collaborators have lately shown[6] that the incidence of chronic infective endocarditis in man is largely determined by the occurrence of small congenital valvular defects.

There are evidently here a series of instances where bacteria will live for a long time in the body, and may cause death, without on the one hand being destroyed by phagocytosis or other defensive mechanism, or on the other reaching an exalted virulence by a process of selective breeding. No explanation of the phenomena is obvious, but it is plain that the facts are of importance and may open up a fruitful field of inquiry. "Virulence" may be too comprehensive a term, and it is possible that it should be dissected into capacity to cause damage in the body and capacity to resist what the body does to destroy the parasite. Such a distinction was foreshadowed by Dr. W. W. C. TOPLEY in his Goulstonian lectures of 1918 on the Spread of Bacterial Infection. The pneumococci in Dr. MAIR'S rabbits, for example, have a considerable virulence in causing a particular sort of damage and a high virulence in escaping destruction. Which suggests that "virulence" of the first kind may require qualification in respect of different sorts of lesions, a view which finds support in the tissue and species specificity of many bacteria. Our knowledge of the relations between host and parasite is derived mostly from the observation of acute infections; it may well require re-examination in respect of chronic fatal conditions, such as infective endocarditis.

[2] Ibid., p. 428. [3] Ibid., p. 426.
[4] Reports on Public Health and Medical Subjects, No. 18, Ministry of Health, 1923.
[5] Journal of Pathology and Bacteriology, 1903, viii., 34.
[6] Heart, July, 1923.

Annotations.

"Ne quid nimis."

PROF. LEONARDO BIANCHI ON OLD AGE.

Leonardo Bianchi, the great master of Italian neuropathology and psychiatry, is this year relinquishing the professorial chair at the University of Naples to the profound regret of his colleagues and students. Prof. Bianchi took for his farewell address[1] the subject of old age, perhaps in reference to the fact that his retirement was occasioned by the age limit, and it is characterised by much interesting material and apposite remarks. Life is regulated, says Prof. Bianchi, by laws of whose nature we are only partly cognisant. We do not know why certain individuals develop precociously, or why the germ of a great talent arrives at maturity only after a long time in the most diverse changes and circumstances of life—and he went on to draw an eloquent picture of old age as it might be, which we render in his own words:—

How many men lay down their arms in life's struggle before reaching the age of 60! Without any more enthusiasm, or eagerness, or even a new thought or application, with no longer any artistic thrill, nor any ambition, not even a hymn to Life or to beautiful and generous Nature. Such men shut themselves in the spiral recesses of an inert habit. What is the reason why one man is degenerate at 60 years and another preserves his mental faculties at 85 or even 90 or more? There is no biological law which fixes the term when decadence of the mental life begins; there is nothing absolute in this matter. The absolute is found in human laws, often inspired by extraneous interests, associated with profound ignorance of the infinite resources of Nature. Meanwhile let us respect this law, our Duty. There is something which watches over individual interests, and that is Discipline. Obedience, in proportion as the social organism becomes more complex, is the greatest human virtue! Erect an altar to it and let it be your law.

As for myself, as long as I have strength and energy I will dedicate to you my whole thought. We were and are all enthusiasts of youth. I might almost say by occupation. Countless times it has incited my thoughts and rendered verdant year by year my existence with spring-like fertility. Living for several decades among you I have felt year by year the reflex of your spirit in myself, with the enthusiasms and generous impulses of youthful years, the hopes wooed by severe struggles, and the anxieties of work animated by an innate yet indefinite force which rendered even joyous the privations hidden under a chaste and sometimes painful gaiety. Youth must tend to become sublimated as it pushes forwards towards maturity and old age, which give force and experience to the prosperous life of the race.

Happy are they who reach without much travail or severe losses the extreme limit of life; and fortunate is the country where a lucid and cheerful longevity is not an isolated and exceptional phenomenon. And remember that the foundations of a strong old age are laid in the vernal years of life. Let me before taking leave of you give you this advice. Keep a part of your youthful energies for maturity and old age, whose activities are the right of the civilisation of the race. With all the respect due to certain researches on rejuvenation, do not delude yourselves as to the results. The rejuvenation of rats and fowls may be nothing else than a firefly for man; just as illusory as the vital sun that Brown-Séquard dreamt of as standing still in order to carry on victoriously the battle of life. The conception of Goethe will remain eternal as regards humanity, and the modern Mephistopheles, decked out by the laboratory experimenter, will in vain bring you an amorous Margherite if your vital balance results in a deficit in the years of youthful enthusiasm. Devote yourselves to the work of the community, and you will be very happy to feel yourselves even at the age of 75 useful to your country. This is my most fervid wish for you.

Prof. Bianchi cited many celebrated men whose mental vigour in old age was proverbial, such as Hobbes, Michelangelo, Kant, Verdi, and Cardarelli, and quoted the instance of Voltaire, who, two years after he had completed the tragedy "Irene," at the age of 83, wrote to a friend, a professor of philosophy, who had apprised him of his dyspeptic troubles: "Your stomach cannot be in a worse condition than my head; my little apoplectic attack at the age of 83

[1] La Riforma Medica, xxxix., July 16th, 1923.

is quite on a par with the state of your bowels at the age of 40. Let us put my meninges and your intestines on the same dish and give them as an offering to Philosophy."

FAMILIAL RETINO-CEREBRAL DEGENERATION.

SINCE this condition was first described by the late Dr. F. E. Batten in 1903 a number of cases have been recorded, both of this disease and of the allied condition of familial macular degeneration without mental defect. An important article by Dr. W. H. Nardin and Dr. R. S. Cunningham appears in the June issue of the *American Journal of Ophthalmology*. In discussing the pathogeny of their cases the authors suggest a connexion with the previously described cases of amaurotic family idiocy, generally known by the names of their first describers, Tay-Sachs. All the cases, they suggest, may belong to one progressive type, with definitely decreasing malignity in character, depending on the time of onset of the symptoms.

"Beginning with the Tay-Sachs type of amaurotic family idiocy, which commences early at 2 to 3 years of age and progresses very rapidly to a fatal termination, we have next in regard to the severity of progression the retino-cerebral degenerative type, the symptoms appearing at the period of second dentition, and finally those cases which, beginning later in life, from the fourteenth year on, show only changes in the retina. . . . It seems possible that the etiologic agent may be the same in these three groups, and the variability of the clinical syndrome the result of the differential resistance of the tissues at different ages."

This last suggestion is of considerable interest, and is well worth bearing in mind by those who have the opportunity of seeing these cases, which are not so uncommon as was once supposed. The present paper records five cases of the retino-cerebral type occurring in one childship of nine members. The age of onset was about seven; epilepsy and progressive impairment of vision, with pigmentation of the macula and progressive mental deterioration occurred. Complete blindness and imbecility followed, terminating with death.

VOLUNTARY AND POOR-LAW HOSPITALS.

Mr. Arthur Henderson, M.P., in a recent letter to the *Manchester Guardian*, pointed out that while thousands of patients are waiting for beds to become vacant in voluntary hospitals, many beds are empty in Poor-law infirmaries, and he called attention to the "serious disorganisation" of the public health service resulting from the distinction between the two types of institution. He referred to a hospital of 15 beds which had 300 patients on its waiting list, some of whom had been waiting for nearly a year; whilst in the Poor-law infirmaries 30,000 beds are said to be unoccupied, as a rule, in the summer months. This communication naturally led to inquiries being made as to the condition of affairs in Manchester and the adjoining districts, with the following results. It appears that at the Royal Infirmary, Manchester, alone over 1200 persons are waiting for admittance, while for all the Manchester hospitals there is an aggregate waiting list of about 4000; so that in Manchester about four would-be in-patients are competing for every vacant bed in the voluntary hospitals. Naturally the question of a pooling of bed accommodation between the Poor-law infirmaries and the voluntary hospitals has been raised. The matter is, however, not so simple as it appears. Whatever the number of vacant beds in the Poor-law institutions in and around London "in the summer months," investigation shows that, so far as Manchester is concerned, beds in the Poor-law infirmaries are filled up as completely as it is considered safe. Before the war the Manchester guardians added 100 beds every two years to meet the needs of the growing population, but this increase ceased during the war. An addition of 200 beds has now been sanctioned. When the number of sick persons chargeable to the Manchester Poor-law hospitals is compared with the total number of beds available—2500—in their institutions, there is only a very small margin of vacant beds; and, moreover, there are generally on an average of from 65 to 70 paying patients in these so-called "vacant" beds. It is stated that the guardians feel that the margin of accommodation at their disposal is so small that little good could possibly accrue from any system of closer coöperation. Much the same state of affairs obtains in Sheffield, which has 775 beds in its voluntary hospitals, while the waiting list numbers nearly 3000, and, moreover, there are very few spare beds in its Poor-law infirmaries; but a promising scheme has been evolved towards the joint control of voluntary and Poor-law hospitals. A Joint Hospital Council, on which the hospitals, the corporation, the boards of guardians, the University, the trade and labour council, and other interests are represented, has been set up and is working successfully. For a year this Council has made arrangements with the Eccleshall board for the reception of patients, paying a fixed rate per patient to the board. There are no "paying patients" in the ordinary sense of the term. To raise money to finance this scheme, it is stated that already over 160,000 of the workers of Sheffield contribute to the hospital scheme a penny out of every pound they earn, and thus become contributors with a direct financial interest in the hospitals, with free treatment therein—certain wards in the Poor-law infirmary being set aside for the use of voluntary hospital patients. By this scheme over £65,000 was raised last year. Over 1700 firms of employers collect the subscriptions, and add one-third to the workers' contributions. This year it is hoped to raise £90,000. A project is on foot to obtain land and buildings for the much-needed additional hospital accommodation, so that the necessary voluntary hospital service may be obtainable to meet present requirements as well as those necessitated by the increase of population.

MISTAKEN CHEST SIGNS.

THE eighth fascicle[1] of Prof. J. Schwalbe's series of monographs on "Mistakes" is devoted to the diseases of the lungs and pleuræ, and is written by Prof. Hermann Schlesinger, of Vienna. If the rest of the series is as entertaining as this volume, there can be little doubt as to the success of its sale. It might be argued that studying mistakes is beginning at the wrong end, and that if the student were carefully taught to associate signs and symptoms with the corresponding morbid conditions there would be no mistakes. By the same token it might be argued that the rising generation should be encouraged to study the blameless lives of famous saints rather than the mottled careers of notorious criminals. But human nature being what it is, we are inclined to find more entertainment as well as instruction in the mistakes of others than in advice calculated to secure colourless perfection. On the subject of asthma alone Prof. Schlesinger is prolific in warning examples. One of the most simple and instructive signs of asthma is prolonged expiration, but the absence of this sign often fails to save the physician from himself and deter him from branding his patient as asthmatic. Eosinophilia is another useful sign of asthma which is frequently not sought, with the result that simple emphysema masquerades as true asthma. Even when asthma is correctly diagnosed it is often badly treated. Iodine and atropine are two of the most favourite remedies, and prescribed with discrimination each has its sphere of usefulness. But when potassium iodide gives no relief, and only provokes increased sneezing and coughing, to continue its exhibition is merely to risk drowning the patient in his own secretions. Yet physicians are apt to continue giving potassium iodide in such cases with a perseverance worthy of a better cause. Atropine also should be abandoned when large doses have been given for some time without benefit. As for the exhibition of adrenalin, it seems to be a veritable pitfall, and when it is given in cases of "cardiac asthma" with disease of the coronary

[1] Leipzig: Georg Thieme. 1923. Pp. 152. 3s. 5d.

arteries it may provoke severe angina and even death. Prof. Schlesinger appeals on behalf of the asthmatic to the specialist with a passion for progressively eroding the interior of the nose with the thermo-cautery in the benign hope that clearing the nasal passages will abort attacks of asthma. Such treatment may, indeed, do good. But, according to Prof. Schlesinger there are rhinologists who find something pathological in every nose, and whose furor operativus is never to be denied when asthmatics fall into their hands. One of the many lessons of this book of errors is that the best clue to obscure chest symptoms may be found well away from the chest, and that examination of the pupils may betray the tabetic origin of a persistent cough which for years has passed muster as an expression of bronchitis. To confess one's own mistakes is usually painful, but vicarious confession is a soothing avocation, giving joy to the confessor as well as to his audience. Even when it is robbed of its edge by anonymity, it can be made entertaining enough.

ACCIDENTAL SYPHILIS IN MEDICAL MEN.

Dr. C. L. P. Trüb,[1] of the University Dermatological Hospital in Bonn, has published a monograph on syphilis as an occupational disease in medical men. This work is frankly a compilation, and the editorial comment with which it is flavoured is of such a neutral and non-committal character that the book is little more than an expanded bibliography. But as such it is very useful and it is likely to prove a valuable work of reference; the more so because of the orderly arrangement and classification of the subjects under discussion. Accidental, extragenital syphilis in medical men is, alas, quite common, and Jonathan Hutchinson alone is said to have seen more than 100 such cases. Dr. Trüb has collected 669 cases from the literature, and it is obvious that this number must represent a mere fraction of the total; syphilis is not a disease which courts publicity. The statistics concerned with the site of the primary lesion show that the fingers, hands, and arms are the parts most frequently infected, and Dr. Trüb has assembled as many as 338 cases in which the chancre was situated in these positions. In another 32 cases the eyes, and in 12 the lips, were the first structures to be infected, and only in two cases was the chancre situated in a tonsil. It is curious to note how frequently medical men and students have deliberately contracted experimental syphilis. It is, perhaps, misleading to use the term "deliberate" in connexion with medical students whose knowledge of the risks they ran must have been far too incomplete to form a basis for deliberation. The medical man who encourages the callow medical student to play the part of the experimental animal in this connexion shows a courage which is as reprehensible as it is vicarious. A separate chapter is devoted by Dr. Trüb to the problem of post-mortem infection. About 30 cases of such infection have been recorded, but only about four of them stand criticism, and even in these four cases the evidence is not as complete as it might be. Incidentally, this monograph shows very clearly how nebulous the conceptions of syphilis were up to the time of Jonathan Hutchinson; the vast literature referring to pre-Hutchinson cases of syphilis is practically valueless as judged by modern standards of diagnosis. But even though proven cases of post-mortem infection with syphilis are very rare, this risk cannot be regarded as negligible, and reference is made by Dr. Trüb to the investigations of Prof. E. Hoffmann, who addressed a questionnaire on this point to numerous pathologists and specialists in syphilis. He obtained 29 answers, and in eight of them accounts were given of more or less definite cases of post-mortem infection. One of the most interesting but most incomplete chapters is that concerned with syphilitic infection without a primary chancre. At least 16 such cases have been recorded in which the patient was a medical man, and in five of these cases the infection was extragenital and vocational.

An important question asked by Dr. Trüb is: How shall the medical man who has contracted syphilis comport himself with regard to his professional work? The answer given is quite definite. In the primary and secondary stages, and when there is a definite rash on the hands and arms, no medical man should attempt to operate or attend maternity cases. When the syphilis is in the tertiary stage, it may be sufficient to protect the limbs with rubber or plaster, but it would be well if full work were not resumed until vigorous specific treatment has been shown by the Wassermann reaction to have been successful. Even then the medical man should undergo systematic serological and clinical examination from time to time, keeping an alert eye for any signs of syphilis of the hands and arms. If the Wassermann reaction is positive, it is necessary to be careful, and, preferably, to discontinue medical practice, even when there are no symptoms. This is a hard saying, and obedience to it must often entail a self-sacrifice verging on economic ruin. But its neglect may sometimes have far-reaching consequences, and there have undoubtedly been several cases of syphilis transmitted to patients by midwives and medical men. In one instance alone a midwife has been known to infect 30 women. This case was recorded in 1883, and it is to be hoped that with our present knowledge—diagnostic and therapeutic—of syphilis, the vocational syphilis of doctors has become a much less serious matter than it was.

[1] Die Syphilis als Berufskrankheit der Aerzte. Von C. L. Paul Trüb. Carl Marhold Verlag, Halle a. S. 1923. Pp. 126.

WORK OF THE ROCKEFELLER FOUNDATION.

IN the review for 1922[1]—including a summary for the first decade—of the work accomplished by the Rockefeller Foundation, by the President, Mr. George E. Vincent, there is presented a survey of unparalleled beneficent work. The Foundation was originally incorporated on May 14th, 1913, under a special charter by the State of New York, and with an initial endowment of $100,000,000, the gift of Mr. John D. Rockefeller. During the past ten years the Foundation has received from its founder a total of $182,704,624. Its total disbursements have amounted to $76,800,000, representing the income from year to year, and $17,500,000 appropriated from principal. In addition, it has pledged future income to the extent of $15,600,000. There is an interesting review of the growth of the science, whose progress, it is pointed out, has followed in a general way Comte's law, which asserts that every body of knowledge passes through two stages, the theological and the metaphysical, into a third, the positive or scientific. This theme is expanded into a chapter on "From Magic to Microbe," and then into an exposition of "Methods, Spirit and Scope of Modern Medicine." As to public opinion and medical progress, it is wisely remarked that unless the leaders of opinion and a substantial proportion of the adult population appreciate the aims and methods of science, science cannot attain the place it deserves or render the service of which it is capable. But in spite of all efforts and in face of evidence there are disheartening instances of an almost benighted ignorance. The remarks on vaccination are singularly appropriate at this juncture.

> "If there is one thing that has been repeatedly demonstrated to the complete satisfaction of all well-trained minds capable of dealing logically with evidence, it is that vaccination for small-pox affords an extraordinary immunity against that disease.....In the United States the disease is widely diffused; in some regions it is almost endemic. Anti-vaccination societies carry on fanatical campaigns of misrepresentation, offering misleading statistics, invoking the authority of discredited physicians, citing unverified cases, and making emotional appeals."

There are some valuable remarks on "the training of doctors," and it is pointed out that "the idea of teaching the medical student all that is known about health and disease is on the face of it absurd." A

[1] The Rockefeller Foundation: A Review for 1922 and a Summary for the First Decade. New York. 1923.

tentative list of the medical schools of all countries prepared by the Foundation shows that there are in all 445 schools, distributed geographically as follows: United States 82, British Isles 43, France 32, Russia 28, Germany 25, China 24, Italy 21, Japan 20, India 18, Spain 11, Mexico 11, Brazil 10, Canada 9, Netherlands 8, Switzerland 5, Belgium 5. Forty-four other countries support from one to four medical schools each. It is the aim of the Foundation to hasten the development of international coöperation in medical education by all available means. An account is given of what has been done for the Peking Union Medical College, and the aid afforded to European medical scientists. Much stress is laid on the training of health staffs in connexion with public health and preventive medicine, and the manner in which this is carried out. Significant and instructive are the titles of other chapters—"Closing in on Yellow Fever," "Controlling Malaria at Low Cost," "Hookworm Disease as an Educator." We have travelled a long way since the first European conference to consider health problems—representing 12 nations—was held in 1851. In the field of international hygiene there has been established a recent creation under the League of Nations of a health organisation which has the support of 52 nations and the sympathetic coöperation of the United States. The Foundation also works through non-governmental organisations and voluntary institutions of various kinds in order to carry out its chartered purpose, which is to promote, not the exclusive prosperity of any one nation, but "the well-being of mankind throughout the world."

THE FIGHT AGAINST RABIES IN DOGS.

THE importance of the strictest observance of the regulations in force with regard to rabies in dogs can hardly be overestimated. Whereas in this island country the number of infections have been reduced to a vanishing point, on the Continent, owing largely to laxity during the war and post-war periods, the disease is greatly on the increase. Recent figures collected in Vienna[1] show that the number of infected dogs trebled during the years 1919–22, and that during the same period the number of human beings treated at the Lyssa Institute doubled. The number of dogs registered in Vienna rose in those years from 37,000 to 77,700, so that in 1922 there was roughly 1 dog to every 24 inhabitants, children included, and this number does not account for the many unregistered dogs. The effect of legislation in the directions of a dog tax, compulsory muzzling, immediate notification and destruction of all dogs known to be or suspected of being infected, regular periodic examination of all dogs and notification of all dog-bitten humans, has been remarkable, as figures from many countries show. The experience gained during the last 40 years at all treatment centres teaches that if these measures were systematically and conscientiously carried out, the disease might be completely wiped out; but it has been found extremely difficult to insist on such measures even in the large towns, and still more so in the outlying districts. One factor that has to be reckoned with is the human love of dogs, and this presents one of the greatest difficulties. Education of the public is one of the most important factors in dealing successfully with the problem. Legislative measures will take a long time to free mankind from the scourge, and therefore additional measures might well be adopted. Dr. Schnürer has since 1905 been employing prophylactic inoculation of dogs against the disease, a measure first suggested by Pasteur, and later worked out by Bouley (1884) and Högyes (1889), but the difficulty in applying it on a large scale to all dogs lay in the fact that to produce sufficient attenuated virus (fixed virus) not all the rabbits in Australia would suffice, and therefore Dr. Schnürer has worked out a scheme whereby stronger and more virulent doses are given, so that fewer injections are necessary, reducing the number from 14 to 2–3. According to the present experience at the Lyssa Institute, the duration and effectiveness of the protection afforded by inoculation depends on the quantity of the fixed virus introduced. As the result of experiments on 93 dogs it was found that by giving 1–2 doses containing a total of 0·33–20·0 g. of the virus subcutaneously or intraperitoneally, the animals could be immunised against infection introduced intraocularly, subdurally, or intramuscularly with 63·6–100 per cent. successes, depending on the nature of the virus and the site of introduction of the infection. Such doses were not injurious to the animals, and the immunity commences on the thirteenth to eighteenth day and lasts up to five years. To demonstrate the use of prophylactic inoculation Dr. Schnürer is now engaged in carrying out experiments on privately owned dogs, who attend as out-patients. He inoculated 50 with five injections of virus in increasing doses, giving a total of 0·665 g. The next 90 dogs were given four injections containing 0·76 g. altogether. One of these was previously bitten by an infected dog and died of rabies; in the rest up to date there has been no evidence of the disease. Fuller details and tables of results are given in the original article.

[1] Prof. Josef Schnürer, Wiener klin. Wochensch., July 12th, 1923.

THE PRODUCTION OF CLEAN MILK.

WHILE official machinery for encouraging the production of clean milk is grinding slowly, and let us hope surely, towards its appointed end, there are abundant indications of a keen desire within the dairy trade itself, and in a variety of bodies associated with the trade, for an improvement in the purity of the milk-supply. We have before us a pamphlet on "Milk Competitions," by the National Clean Milk Society, a body whose avowed object is "to raise the hygienic standard of milk and milk products, and to educate the public as to the importance of a clean and wholesome milk-supply." The pamphlet gives a lucid and useful description of methods of improving the production and the quality of milk through the stimulus afforded by competitions. Two score card systems are described, the more elaborate adapted for assessing the efficiency of production, and the simpler system for evaluating the quality and purity of the final product. The information is set out in simple style. It is suggested that the promoters of such competitions might arrange for the prizes to be offered either by public health authorities, by local organisations anxious to promote improvement in the hygienic quality and chemical composition of the milk-supply, or by firms directly interested in the milk industry. In the same connexion reference may be made to a paper by Mr. A. T. R. Mattick, of the National Institute for Research in Dairying, Reading, on the production of clean milk. The paper deals in detail, in the clearest way, with the whole course of production of milk, from the cowshed and the milking shed to the milk room up to the stage of bottling, including details of the preparation of utensils, of premises, and of the cow. The pamphlet does not aim at putting forward any specially original views, but it succeeds in providing a simple and systematic description of procedure which should be of real value to the dairy farmer. The distribution of instructions of this type throughout the dairy industry—especially if such distribution were organised by the industry itself—would be more likely to create an atmosphere leading to improvement in milk-supply than the most heroic efforts of the official administrator. The process of cleaning must indubitably, if it is to be effective, come from within the dairy trade itself.

INTERNATIONAL CONFERENCE ON LEPROSY.

THE Third International Conference on Leprosy assembled at Strasbourg from July 28th to 31st. Official delegates representing 46 countries attended this conference, and a number of learned societies and other organisations from different countries were also represented. Great Britain, India, Australia,

and some other British dominions, colonies, and protectorates were separately represented by official delegates. The conference was opened by Mr. Paul Strauss, the French Minister of Health, and the scientific sessions were held under the presidency of Dr. Ed. Jeanselme, professor of medicine in the University of Paris. The official text of the resolutions embodying the conclusions arrived at as the result of the deliberations of the conference is as follows:

La 3ème Conférence Internationale Scientifique de la lèpre maintient les principes d'organisation de la lutte contre la lèpre admis par les conférences précédentes et adopte les résolutions suivantes:

(1) Les prescriptions législatives concernant la lutte contre la lèpre doivent différer suivant les pays auxquels elles s'appliquent, mais, dans tous les cas, il faut interdire l'entrée des lépreux étrangers.

(2) Dans les pays où la lèpre est peu répandue, l'isolement dans un hôpital, ou à domicile si celui-ci est possible, est recommandé, tel qu'il est pratiqué en Norvège.

(3) Dans les foyers d'endémie lépreuse, l'isolement est nécessaire. (*a*) Cet isolement doit être humanitaire et laisser le lépreux à proximité de sa famille, si cette mesure est compatible avec un traitement efficace. (*b*) S'il s'agit d'indigents, de nomades ou de vagabonds et d'une façon générale de personnes qui ne peuvent être isolées à domicile, l'isolement sera pratiqué et le traitement le plus efficace sera appliqué dans un hôpital, un sanatorium ou une colonie agricole suivant les cas et les pays. (*c*) Il est recommandable de séparer de leurs parents les enfants de lépreux dès leur naissance et de les maintenir en observation.

(4) Les membres de la famille du lépreux doivent être soumis à des examens périodiques.

(5) Il faut faire savoir aux populations que la lèpre est une maladie contagieuse.

(6) Il y a à interdire aux lépreux les métiers qui les exposent à propager les germes de leur infection, mais en ce cas la société a le devoir de considérer que cette interdiction lui impose l'obligation d'assister le malade et les personnes dont il est le soutien.

As no official English text of these resolutions was presented or discussed at the conference, it would obviously be out of place to print an unauthorised translation of them.

DECAPSULATION OF THE KIDNEY IN ECLAMPSIA.

Dr. Albert Niedermeyer,[1] of Schönberg, reports a case of severe eclampsia with coma, in which the life of the patient was saved by decapsulation of the kidney.

On Jan. 9th, 1923, the patient, a primipara, aged 20, was seized with eclamptic convulsions, which rapidly increased in severity and frequency until they were almost continuous. The presentation was normal, and the membranes were intact, but the fœtal pulse-rate rose rapidly and was soon imperceptible. Catheterisation produced a few drops of brownish urine, which solidified on boiling. As the condition was urgent, and there was little possibility of saving the child (seventh month) perforation was undertaken under light chloroform anæsthesia, and the uterus was emptied. Treatment by venesection, morphia, and chloral in a darkened room was given, but the hope that the rapid emptying of the uterus would arrest the convulsions was not realised. On Jan. 10th, at 10 A.M., saline was given, one litre rectally and one litre subcutaneously, and at 11 A.M. venesection was repeated. During the afternoon coma set in with loud snoring, cyanosis, and foaming at the mouth; at 3 P.M. the saline infusion was repeated, but the coma deepened and was accompanied by complete anuria. A few drops of urine which were withdrawn coagulated. The respiration and pulse became worse, the face and lips were blue, the pupils dilated and fixed, the face sunken, and there was a tracheal rattle. As death seemed imminent decapsulation was undertaken as a last resort. At 5 P.M. the kidney was exposed under light chloroform anæsthesia, and without displacing the organ the capsule was removed as far as possible, the remainder being stripped back as far as the hilum. The wound was closed in layers and a gauze strip inserted into the lower angle. From the time of the operation onwards there were no further convulsions, the respirations and pulse improved, and the coma lessened into a quiet sleep, with disappearance of the cyanosis. On the following day, at 6 A.M., the patient reacted when spoken to, and at 9 A.M. 300 c.cm. of light-coloured urine were withdrawn on catheterisation; albumin by Esbach ½ per thousand. In the evening 200 c.cm. were withdrawn with a trace of albumin, and during the night a quantity of urine was passed spontaneously. On Jan. 12th consciousness returned, and from the next day the urine remained free from albumin. The wound healed by first intention, and on the 27th the patient was discharged.

In this case it can hardly be doubted that the operation was directly responsible for the immediate improvement. Dr. Niedermeyer is of the opinion that had it not been so, the condition of the patient was so grave, that an intervention of that magnitude must have been fatal. Of interest is the rapidity with which the operation had effect. Dr. Niedermeyer quotes Edebohl, who holds the view that decapsulation first shows its effect 10 days after the operation; but from the experience derived from the case reported, he cannot agree with him. It was obvious that here the effect was immediate, but he is inclined to think that the operation should only be undertaken in cases of acute anuria, and that in such cases it can have no purpose unless the effect is immediate. In discussing the mechanism of the results of decapsulation, he reminds us of the view expressed by Edebohl and others that new blood-vessels are formed between the surface of the kidney and the surrounding fat capsule, and thus the blood-supply to the organ is improved. But it has been shown that in some cases a new fibrous capsule very soon develops in place of the one removed, possibly before the new capillaries have had time to form, and anyway, if a new capsule did not grow, the development of the new blood-supply would be too late in acute cases, where the effect is required immediately. Most recent authors take the view that the chief effect lies in the mechanical relief of the renal tension, and the French writer Pousson, speaks of "glaucoma of the kidney." It appears that in acute anuria it is the enormous rise of intrarenal pressure, increased by the non-elastic, firm capsule, that leads to obstruction to the circulation and to the outflow of urine, and finally, to complete paralysis of the secreting cells. If this explanation is accepted, it is obvious that if decapsulation helps the kidney, it does so immediately, and it also explains why in chronic cases the results are so disappointing. It also explains why unilateral decapsulation is sufficient, for no sooner is the pressure on one side relieved, and the passage of urine accomplished, than is the attempt at secretion by the other lightened, and so the vicious circle is broken. The second kidney then gradually recovers its equilibrium. Obviously the danger of a unilateral operation is less than a bilateral, especially as the operation is hardly to be recommended except when other measures have failed and the patient is in extremis.

[1] Deutsche medizinische Wochenschrift, June 8th, 1923.

THE MIDDLE WAY IN THE TREATMENT OF FUNCTIONAL NERVE DISORDERS.

Dr. R. G. Macdonald Ladell, in the *Practitioner* for August, presents certain principles which have emerged from the chaos of controversy. His "middle way" lies between psycho-analytical technique on the one hand, and the total neglect of mental processes on the other. There can be but few practitioners, he judges, whose work brings them much in contact with nervous disorders who do not realise the fundamental truths of Freud's doctrines; yet, though for some cases psycho-analysis is necessary, current conflicts predominate in most of the patients who seek the aid of the physician, and for these no deep analysis is needed. But the physician must be prepared to discuss many questions, both in regard to sex and to other difficulties, when the shoe of civilisation pinches, and he must be free of embarrassment or diffidence, which, if shown by him, will only increase the patient's repressions. Plainly, as Dr. Ladell says, the personal factor is bound to count largely when dealing with these cases, and his remarks suggest that radical differences of opinion on what should be matters of observation perhaps have their origin in the temperament of the observers. We can imagine the neurotic, who is often sensitive and over-scrupulous, with-

drawing into the protective shell of reticence at the slightest hint of surprise or embarrassment on the part of the physician, just as we can imagine—or perhaps recall—physicians whose manner invites that open confession which is good for the soul. One temperamental type of medical man finds himself making observations and gathering facts about neurotic illnesses which for another type remain as in a closed book. The fundamentals of psychopathology are now sufficiently established for such inequalities to be lessened by giving instruction in the subject to the medical men and women of the future. Whatever kind of case may be allotted to the psycho-therapist, the middle way in treatment must be the way of the general practitioner.

PROF. IVAN PAVLOV IN LONDON.

AT the conclusion of a two-months tour in France and the United States, Prof. Ivan Pavlov of Petrograd attended the International Congress of Physiology at Edinburgh, after which he spent a week in London before returning to Russia. We have received from a correspondent an account of a visit which he paid to the Middlesex Hospital on August 6th, when he was received by a number of members of the medical staff of the hospital and its medical school, and expressed appreciation of all that he saw, being particularly interested in the cases of diabetes under treatment with insulin, and in the new laboratories which are shortly to be opened. The eminent physiologist, who is now in his seventy-fourth year, is a striking example of the boundless activity and imaginative force which is the gift of the greatest scientists. Amidst the tragic chaos of the revolution in Russia he has been able to continue his work, and it comes as a surprise to many in this country to learn that at the present moment he has some 30 fully-qualified assistants working under him at his laboratories at Petrograd. Prof. Pavlov, during his visit to the Middlesex Hospital, made especial comment on two things. The first was that the hospital, the research departments, and the medical school formed a complete unit, allowing the fullest coördination between teaching, research, and modern treatment, a condition of affairs seldom successfully realised elsewhere. But side by side with this he was disappointed to find here, as in other institutions in England, that research is seriously hampered by the severity of the restrictions on vivisection. The wide repute of Pavlov's book on the "Work of the Digestive Glands" may have obscured the realisation in the minds of the medical profession of the fact that his work has chiefly been concerned with the physiology of the central nervous system. For many years past his experiments have been directed to elucidate the problems of sleep, inhibition, and conditional reflexes. We are happy to learn that this work is now far advanced, and that Prof. Pavlov hopes in the autumn to bring out a book which will be to the neurologist as profoundly interesting and important as was his work on digestion to the general physician and physiologist.

KING'S COLLEGE HOSPITAL.—An extraordinary meeting of the Committee of Management of King's College Hospital was held on August 9th to authorise the establishment of a dental school under the direction of Dr. Alexander Livingston of Liverpool University. At the same meeting was received the resignation of Mr. F. F. Burghard, senior surgeon, to whose work in connexion with the hospital and medical school a tribute was paid by the chairman, Viscount Hambleden. He is succeeded on the committee as senior surgeon by Sir G. Lenthal Cheatle. To the committee was also added Mr. P. A. Willson. The other business included the appointment of Mr. H. J. R. Surrage as an additional honorary anæsthetist. The committee passed a resolution of thanks to the Winter Distress League for undertaking a considerable amount of cleaning in different parts of the hospital which could not otherwise have been done owing to lack of funds, and also gratefully accepted the offer of the Talfourd College for Girls to maintain a cot in the children's ward.

Modern Technique in Treatment.

A Series of Special Articles, contributed by invitation, on the Treatment of Medical and Surgical Conditions.

XXXIII.

TREATMENT OF SYPHILIS IN THE WOMAN OF CHILD-BEARING AGE.

SOME competent observers have stated that syphilis in women is in the main a much less serious infection than it is in the male. This may be so for the individual, though I am not prepared wholly to admit it; but for the ultimate welfare of the race no case of syphilis in a woman can possibly be dismissed as a light case, or as necessitating a lower standard of treatment than one showing more serious manifestations. The treatment of syphilis in women presents two different aspects: the first is that of acquired syphilis with signs and symptoms as in the male; the second is conceptional syphilis in which frequently during the child-bearing period no signs appear, the woman complains of no disability, but gives birth to premature, stillborn, or weakly and diseased children.

Acquired Syphilis in Primary or Secondary Stage.

Here the treatment is straightforward, its duration depending on the stage at which the case is seen; the patient requires a minimum of two years' steady treatment if seen in the primary stage—considerably more if not seen till secondary lesions are present.

If properly prepared—i.e., with bowel empty and no meal having recently been taken—women almost always take intravenous injections of 914 preparations well. At the menstrual period a smaller dose may well be given, but otherwise doses ranging from 0·3 to 0·6 g. are injected once a week, either of novarsenobillon, sulfarsenol, or stabilarsan, till 4 g. in all have been given. At the same time pil. Hutchinson should be taken thrice daily and a gargle of pot. chlor. is used as routine after each meal. In my experience women much prefer taking pil. Hutch. orally rather than have the routine injection of Lambkin's cream in addition to the 914 injection. After a course of 914, pills are stopped for two weeks, and then a Wassermann test is done. If the W.R. is negative and the case was first seen in the primary stage, the patient is allowed to carry on with pills alone for two months, when the W.R. is again tested; but if the case was first seen only when well-established secondary lesions had developed, the patient is given pills to last a month and told that a further set of injections will be given at the end of that time. The patient either takes a little sulphur at night during this month—many patients like confection of sulphur or trochisci sulphuris as aperients—or else the second course of injections is ushered in by an injection of intramine, sulphur being used as an antidote to, or as a preventive of, metallic poisoning by arsenic or mercury. The second course of injections may be of a slightly different type from the first—i.e., if N.A.B. was given in the first instance, sulfarsenol (0·36 to 0·6 g. dose) may be given, or silver salvarsan (0·1 to 0·3 g. dose) till 1·5 g. of the latter or 4 g. of the former have been given. The W.R. is then repeated, and if it is negative and if no signs or symptoms are present the patient is treated by pills only. The urine is tested for albumin as routine before each injection and inquiry is made as to any unpleasant symptom following the last injection—any complaint of headache, sickness, or urticaria requiring careful investigation. Bowels should be carefully regulated with salines and all carious teeth must be removed.

During the remainder of the treatment Wassermann tests are taken about every three months and a further course of injections is given if required. If all the tests are negative and the patient's condition is satisfactory pills only are given during the remainder of the time.

Standard of Cure in Women.

The standard of cure adopted at my clinic is persistently negative W.R. over two years without sign or symptom, even after a provocative injection has been given. If this standard is met by a patient she is discharged, on the clear understanding that if she becomes pregnant she must return for treatment by the time she is eight weeks pregnant. A case first seen in the late secondary stage is hardly likely to reach this standard of cure, and in many cases these patients after three years steady treatment are sent away and told to return twice a year for a month's intensive treatment—i.e., injections of 914 and a mixture of potassium iodide and mercury. This method of dealing with intractable cases has so far given most gratifying clinical results.

Conceptional Syphilis.

A considerable number of women are met with who have given birth to stillborn or diseased children without themselves showing any signs of acquired syphilis, at least during the child-bearing period. These are mainly the wives of men who have had syphilis and have been insufficiently treated. These cases are most intriguing and sometimes very difficult to diagnose as they are frequently seen for the first time during pregnancy, having been referred for an opinion from a maternity centre. When besides a history of ante-natal and neo-natal deaths a positive W.R. is obtained, treatment is at once instituted; but the W.R. is very uncertain during pregnancy and just after delivery, so that a negative W.R. does not of necessity exclude conceptional syphilis. In such a case an effort is made to get an interview with the husband and often a very old history of syphilis is obtained, the man frequently having forgotten about it as he has had no symptoms and has not connected his wife's obstetric calamities with his old disease. I could quote instances of this type of case in which the woman's W.R. had never been positive.

It is held by some syphilologists still that a mother with no symptoms and a negative W.R. is not herself syphilitic and does not require treatment. This seems to me an unsound theory; there appears to be in these cases of conceptional syphilis a degree of immunity in the mother herself which frees her from signs and symptoms of syphilis *during the child-bearing period;* but after the menopause symptoms frequently appear. There are in my department several women past the menopause who never had syphilitic manifestations while childbearing, and now have gummata of the back or thigh or the common ulceration of the outer side of the ankle and a positive W.R. In practically every history a case is obtained of stillbirths or of delicate weakly children who died young; one woman, who was perfectly well till a gumma occurred on her thigh this year, has her youngest child, aged 19 years, being attended at an eye hospital for "Hutchinson's salmon patches." I think this post-menopausal appearance of symptoms is a complete refutation of the claim that these women are not syphilitic.

Treatment of Syphilis During Pregnancy.

The treatment of syphilis in women during pregnancy is practically the same as at other times. These cases of conceptional syphilis are at once given pil. Hutchinson and have a weekly injection of 914 for about six weeks; after that a fortnightly one till 4 g. has been given. Injections may be given right up till the day of delivery without ill-effect. Patients are encouraged to return as soon after delivery as possible and are then given from 6 to 10 fortnightly injections of 914 while suckling. Cases that have previously had complete treatment for syphilis require, of course, only a few injections during pregnancy, an injection every three or four weeks usually being ample. There has been practically no toxæmia in these cases and the children are remarkably satisfactory, strong, without lesions, and in most cases above the average birth weight. One little known but quite definite symptom present in some of these cases of conceptional syphilis is a purulent vaginal discharge which may be slight or profuse, *is not gonococcal*, and clears up without any local treatment when antisyphilitic measures are adopted. This symptom has to my knowledge been mentioned in this country by only one other observer, Prof. W. C. Swayne,[1] of Bristol, but has been seen by me for some years and pointed out to students.

Conclusion.

I would emphasise the necessity for all practitioners to have their cases of possible conceptional syphilis carefully investigated. With a history of stillborn or weakly children and with no toxæmia of pregnancy or obvious disease of either parent the possibility of conceptional syphilis must be borne in mind; the results of treatment far outweigh any slight inconvenience—they are really brilliant; the technique is simple and the cost very moderate.

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Special Articles.

FACTORY INSPECTION IN 1922.

REPORT OF THE CHIEF INSPECTOR.

THE report of the Chief Inspector of Factories [2] shows how the work of his department is becoming more and more technical and specialised; thus while there are 137,858 registered factories (apart from 145,684 workshops which for the most part are small and of inconsiderable importance), special codes of regulations, in addition to the main provisions of the Factory Acts, apply to 99,332 works or departments within works. The duty of enforcing the requirements of these codes calls for technical knowledge and must be onerous. Accident prevention has continued to receive special attention, and important progress is reported in improving the standard of safeguards; but the spirit of safety-first—the appeal to the mentality of the worker—is being called upon to effect better results. Instances of its value are quoted: a fall from a figure of 94 in 1920 to one of 52 in 1922, combined with a lessened severity rate from 1·44 days lost per 1000 workers to 0·88; a reduction in lost-time accidents from 347 in 1919 to 80 in 1922; a reduction in compensation paid per £100 wages from 5*s.* 6¼*d.* in 1914 to 2*s.* 10*d.* in 1922. Such instances are proof of the value of eliminating hazardous practices. Accidents are frequent among casual labour, but far less so among regular and experienced workers; hence labour turnover should be minimised. Hours of work would appear to have been permanently reduced without recourse to legislation, and now rule at from 44–48 per week. Output would not seem to have materially suffered, while overtime rates militate against any extension in the future; the half-time system for children has disappeared even in Lancashire; the two-shift system has not had a fair trial yet, as, although 235 Orders have been made permitting it, it has, owing to trade depression, been actually used in only few cases.

Voluntary (in contra-distinction to statutory) welfare is holding its own, it is the direct outcome of the war period and is the spirit of true welfare, which must come from within—from the workers themselves and the management. In one interesting scheme the vicar of the parish acts successfully as welfare supervisor, even seeing after the fencing of machinery. Another venture is the combination of employers to support schemes for all their employees. Statutory welfare is enforced by special orders, of which there are now many applying to different industries; good work is being done thereby, but there is danger lest

[1] Brit. Med. Jour., 1921, ii., 476.
[2] Annual Report of Chief Inspector of Factories for 1922. H.M. Stationery Office. [Cmd. 1920.] 1923. Pp. 153. 5*s.*

the letter, rather than the spirit, is complied with. First-aid equipment is now an integral part of works organisation, and septic poisoning is being materially reduced thereby, a decrease of 50 per cent. being reported by one insurance company.

Lead Poisoning.—Electric Shock.

Dr. T. M. Legge's report is rather shorter than usual; he tells of the control maintained over lead poisoning, which now only accounts for less than 250 cases a year, whereas ten years ago 500 cases seemed to be an irreducible minimum; the pottery industry still contributes unduly to the total. Interesting figures are given of the occurrence of epitheliomatous ulceration; 64 per cent. of the cases were between 40 and 60 years of age, and 20 per cent. over 60; 51 per cent. had been employed 20 years and over with exposure to pitch, tar, or paraffin; the face and neck were implicated in 43 per cent. of the cases, and the scrotum and groin in 29 per cent. The examination by certifying surgeons of young persons for fitness is gradually increasing in importance, but remains unsatisfactory for lack of any subsequent examination; about 2 per cent. of juveniles were rejected as unfit.

Mr. G. S. Ram deals with accidents due to electric shock, and again stressed the need for prolonged artificial respiration in every case; he instances cases brought round after 15, 20, 30, and 45 minutes, as well as others where efforts were either not attempted or given up after a few minutes. He puts forward an observation, quaint and unexpected, that after severe and prolonged shock, if the patient has a bad fall but escapes from fatal injuries, he recovers from the shock; and asks whether mechanical shock may not be a successful form of treatment for cardiac fibrillation, and how it should be applied.

Special Research Work.

A feature of the report is the inclusion of special research work; that of Dr. G. L. Middleton on the effects of dust inhalation will be referred to in connexion with a special report by the same author in collaboration with Dr. E. L. Macklin; another report, by E. M. Hewitt and E. M. Bedale, concerns the physiological cost to women of different methods of weight-carrying. This is an instance of laboratory research directed to elucidate a practical problem; different weights were carried (*a*) on a tray, (*b*) on a tray with shoulder strap, (*c*) with load divided, and (*d*) with load on shoulder, while the oxygen consumption per horizontal kilogrammetre of work was estimated. For loads of 20 to 30 lb. the method of carrying seemed to be a matter of personal choice; at 40 lb. a divided load or shoulder carrying was more economical; at 50 lb. shoulder carrying was cheapest. Details of the observations made and illustrative graphs are given.

CONGRESS OF THE ROYAL SANITARY INSTITUTE AT HULL.

IN THE LANCET of August 4th (p. 251) we dealt with the opening of this Congress and the President's address. The business of the Congress was transacted in four sections—viz., Sanitary Science, Engineering and Architecture, Maternity and Child Welfare (including School Hygiene), and Personal and Domestic Hygiene, and in seven conferences—viz., those of Sanitary Authorities, Port Sanitary Authorities, Medical Officers of Health, Engineers and Surveyors, Veterinary Inspectors, Sanitary Inspectors, and Health Visitors. The multiplicity of subjects was so great that it may be truly said that every delegate had some opportunity of voicing what was in his mind. It was perhaps inevitable that occasionally the programme should be overloaded, but we would respectfully suggest to the management that at future congresses the business should begin at 9.30 A.M. and end at 1 P.M. The nominal hours were from 10 to 2, but the hour from 1 to 2 P.M. is purely nominal. We would also suggest the limitation both of the number and duration of the presidential addresses. Space permits reference to only a very few of the subjects discussed.

Housing.

The housing question, as was natural in the present parlous condition of housing, received much attention. The city engineer of Edinburgh, Mr. A. H. Campbell, advocated the acquisition by local authorities of all slums in their areas with a view to putting them into a better state, pending the erection of a sufficiency of new houses. Alderman Cheverton-Brown, secretary of the National Federation of Property Owners, voiced the difficulties of property owners, including the problem of the dirty and destructive tenant. His remedy for house shortage was the removal of restrictions, the restoration of confidence amongst investors, and the encouragement of private enterprise. Miss A. Churton, secretary of the Rural Housing and Sanitation Association, also favoured the acquisition of unhealthy areas and their management on lines associated with the name of Miss Octavia Hill. The woman's part in smoke abatement was ably dealt with by Mrs. Cloudesley Brereton, and the much more extended use of electricity in the home was advocated in a practical manner by Lieut.-Colonel Vignoles, borough electrical engineer of Grimsby. The latter's ideal was a house with one fire for the hot-water cistern, and in which electricity is used for lighting, cooking, heating in the other rooms, and as an auxiliary to the hot-water supply.

Preparation of Food.

The hopeless state of housing probably stimulated interest in the food question. Miss Florence Petty indicated how better knowledge of cookery might be conveyed to existing mothers. Mr. A. R. Tankard, F.I.C., showed that 20 per cent. of our foods, exclusive of milk, are chemically preserved. The need for much greater cleanliness in the preparation and distribution of food was discussed by Dr. W. St. C. McClure, who advocated the licensing and supervision of all premises where food or drink is prepared or served. The importance of food, and especially of a vitamin-rich diet, as a means of increasing resistance against tuberculosis and of preventing a minor infection from developing into recognisable disease was strongly emphasised by several speakers.

Other Topics.

Dr. O. K. Wright (of the Ministry of Health) supplied an interesting paper on scientific methods in public health propaganda, and Dr. W. Allen Daley (M.O.H., Blackburn) dealt with this subject in special reference to cancer. Light treatment was dealt with at various sessions, and Sir Henry Gauvain gave an instructive address on Alton methods. A thoughtful and suggestive paper on infantile mortality by Prof. F. E. Wynne (M.O.H., Sheffield)[1] provoked a good discussion, but seemed to be misunderstood by several members of his audience. Papers by Dr. S. G. Moore (M.O.H., Huddersfield) and Dr. H. Scurfield (formerly M.O.H., Sheffield) dealt more particularly with that portion of infant mortality which occurs in the first month of life. While Dr. Scurfield left it an open question as to how the new midwifery—i.e., the execution of the skilled obstetrical work during pregnancy instead of as an emergency procedure during labour—was to be carried out, Dr. Moore advocated the Huddersfield system of notification of pregnancy, by means of which the expectant mothers are visited at home by duly qualified doctors appointed by the corporation.

Tuberculosis and Milk.

In the discussions on the prevention of tuberculosis some speakers favoured the cutting off of the supply of seed and others favoured making the soil unsuitable; the Greek representative, Dr. Alexander Cawadias, intervened usefully to point out that we

[1] See THE LANCET, August 4th, p. 211.

must have a combination of both methods. It is always a little unfortunate, and must be mystifying to the lay public, that medical speakers do not make two points clear in these discussions on the prevention of tuberculosis—viz.: (1) that a safe milk-supply can only prevent the human mortality caused by bovine tuberculosis, estimated at 6½ per cent. of the total tuberculosis mortality, or 3000 deaths annually in England and Wales; (2) that the 90 per cent. of infections with tuberculosis which occur in childhood do not as a rule become recognisable disease, and either heal up or become latent. The possibility of latency indicates the need for increasing resistance, but the undue influence of the universality of infection doctrine leads to fatalism, and a conviction that measures to prevent infection, even massive doses of infection, which, along with other conditions, give the latent disease its chance of becoming active, are futile. The importance of milk as a food had due prominence. Dr. Stenhouse Williams put the case ably for what may be called the Reading system of Grade A tuberculin-tested milk at a cost little above that of ordinary milk; Dr. S. G. Moore presented the case for pasteurised milk, while there were not wanting advocates of dried milk. Again, it is unfortunate for the information of the public that medical speakers should speak loosely of the destruction of vitamins by heating processes, without mentioning which vitamin, seeing that it is now generally recognised that in most heating processes the vitamin destruction is limited to a portion of the vitamin C (antiscorbutic), and easily compensated for by orange juice, &c. The "nature" argument in favour of raw milk was met with the response that cow's milk, its derivatives butter and cheese, and eggs are quite unnatural foods for man, and that the only reasonable method is to apply the tests of modern science to the foods which man uses, and decide whether they are good, bad, or indifferent. The experience of China was mentioned as a country riddled with tuberculosis, in which cow's milk was not used, but no information was available as to whether the type of tuberculosis is more virulent there, in a population presumably not immunised in any degree by bovine tuberculosis. In any case he would be a bold man who would suggest the general use of raw milk for children, seeing that the present partial use of it constitutes an immunisation experiment which causes the deaths of 3000 children annually in England and Wales, and a corresponding damage rate. Dr. J. Cates (M.O.H., county of Surrey) contributed a paper on the training of women for public health work, which ended with the expression of his conviction that the trained nurse will come into her own and will be allowed to follow a career for which she is particularly well adapted.

Dr. R. A. O'Brien (of the Wellcome Research Laboratories) advocated the use of the Schick test by sanitary authorities, and expressed the opinion that the time will come when the occurrence of a case of diphtheria amongst the staff of a fever or children's hospital will indicate unforgivable neglect.

In a paper on Practical Disinfection Prof. H. R. Kenwood criticised the tests at present in use for disinfectants, and the misleading statements made by manufacturers on the strength of such tests. He thought manufacturers making false claims should be liable to heavy penalties, as is the case in America.

A paper by Dr. E. Colston Williams aroused considerable interest, and showed that the movement in favour of pit-head baths is making headway.

Dr. G. A. Auden (school medical officer, Birmingham) recorded the particulars of an interesting experiment, under which children suffering from malnutrition were given an extra milk ration. The experiment lasted several months, and the results, both physical and mental, were remarkable. The experiment was very carefully conducted, and Dr. Auden hoped it would be the precursor of other experiments on a larger scale.

PUBLIC HEALTH LEGISLATION IN THE IRISH FREE STATE.

A DEPUTATION from the Irish Medical Committee, consisting of Dr. J. M. Day, Senator W. O'Sullivan, M.D., Dr. R. J. Rowlette, Dr. J. P. Shanley, Dr. T. Hennessy (medical secretary), and Mr. C. H. Gick (secretary), waited on the Minister of Local Government (Mr. E. Blythe), Irish Free State, on August 1st. The deputation was accompanied by representatives of the Connemara medical officers. The deputation was introduced to the Minister by Prof. M. Hayes, T.D., National University (Speaker in the Dail). Its main object was to make certain representations with regard to the Public Health Bill, which was to have been brought forward in the Dail at an early date.

The View of the Irish Medical Committee.

Dr. Rowlette, speaking on behalf of the deputation, said that although the forthcoming election might seem to make their visit untimely, they thought it right, when the Minister was willing to receive them, to make their views known. It was understood that the Department had been at work on a draft for a Public Health Bill; no measure would be adequate unless it was thorough-going, as the condition of Ireland gave cause for anxiety. The death-rate in other countries had fallen greatly in the past 60 years; in Ireland it was practically stationary; the mortality from tuberculosis had fallen in Great Britain by more than a half, in Ireland by only a third. Infant mortality in Ireland as a whole was not high, a fact observed in all pastoral countries, but in the Irish cities it was alarmingly high, Dublin having the highest infant mortality in the British Isles—134 per 1000, as compared with 80 per 1000 in London. Less care was paid to public health in Ireland than in any civilised country in the world; in the whole of the Free State there was only one whole-time medical officer of health—the officer for Dublin. In country districts sanitary work, in the modern sense, hardly existed. The dispensary doctor was medical officer of health for his district as well as dispensary doctor, and for the duties of this added office he was paid a separate salary, which varied in different districts from £5 a year to £30; rigorous attention to preventive work was thus made impossible.

The deputation urged the Minister to accept in its entirety the programme of the Irish Public Health Council, which had been accepted by the medical profession and by the press and had recently in its essentials been put forward by the General Council of County Councils, a body thoroughly representative of the ratepayers of the country. The central features of the programme were the establishment of a Ministry of Health and of a National Medical Service. The Irish Medical Committee saw no hope of making the public medical services attractive to the best class of young Irish medical men and women by any other means than by the establishment of a national medical service. The profession had welcomed the reforms carried through by the first Dail and on the proposals of the Minister, but they did not go far enough, save in one particular, the abolition of district hospitals, where, indeed, the changes went too far. The establishment of the county as the health unit was a great advance. The Irish Medical Committee thought that the setting up of a body such as the Irish Public Health Council, or a health council such as was recommended in the report of the Irish Public Health Council, would be helpful to the Minister.

Reply of the Minister of Local Government.

The Minister stated in his reply that in view of the early dissolution of the Dail it would be impossible for him to adhere to his intention of introducing a Public Health Bill, but he hoped that it would be one of the first measures to be introduced after the election. He fully realised the unsatisfactory condition of health questions in the Free State; it was his intention to deal with public health before undertaking the reform

of the medical services. He proposed to appoint a medical officer of health for each county, with school medical inspectors and tuberculosis medical officers under him. He hoped that such salaries would be paid as would attract the best young doctors in the profession in Ireland. He did not favour the establishment of a Ministry of Health apart from that of Local Government; he considered it was only a difference in nomenclature which in practice meant very little. He favoured the formation of an advisory body similar in functions to the existing Irish Public Health Council, but thought that the question of a national medical service required further consideration. The deputation then continued the discussion with Mr. McCarron, Secretary of Local Government, and Dr. E. F. Stephenson, Medical Administrator.

Mr. O'Maille, T.D., brought forward the case of the Co. Galway doctors, especially those in the Connemara district, and protested against the action of the Local Government Department in refusing to sanction the full amount of £300 per annum for dispensary doctors in Co. Galway. Two representative practitioners from Connemara stated that their districts were 20 miles in length and 15 miles in breadth; one of them mentioned that the population of his district was over 8000, that as many as 80 per cent. of these were treated gratuitously under the Medical Charities Acts, and that to give sufficient attendance to the sick in his district he would have to be paid more than double his present remuneration to cover travelling expenses.

The deputation discussed at considerable length other questions concerning the Poor-law Medical Service—viz., inadequate salaries, arrangements for holidays, and fees for occasional services.

UNITED STATES OF AMERICA.

(FROM AN OCCASIONAL CORRESPONDENT.)

Passing of Another Pioneer.

WITHIN a few weeks of the death of Dr. Hermann Biggs, reported in my last letter, New York has lost another of her medical pioneers by the sudden death from heart failure of Dr. John H. Pryor, head of the board of directors and physician in chief at the Perrysburg Hospital. He was the founder of Ray Brook Sanatorium, the first public institution for the exclusive treatment of tuberculosis in this country, and situated only a few miles from the Trudeau Sanatorium at Saranac Lake. Afterwards, at Perrysburg, he turned his attention to the treatment of surgical tuberculosis by heliotherapy and artificial light, and developed an institution worthy to be compared with those of Sir Henry Gauvain at Alton or of Dr. Rollier at Leysin. Dr. Pryor was also one of the founders of the National Tuberculosis Association. He was 62 years of age.

Control of Urine Sugar under Insulin Treatment.

The importance of avoiding dangerously low sugar excretion has been amply demonstrated during the early experience with the treatment of diabetes by insulin. Mr. Irvine H. Page, of the Eli Lilly Research Laboratories, reports a method[1] for which he claims both simplicity and accuracy, with the additional advantage that it can be used for determining slight excess of sugar excretion in "borderline diabetes." This method consists in hourly sugar determinations throughout the day (7 A.M. to 7 P.M.), and a further test of the 12-hour combined night urine, by the Benedict-Osterberg method.[2] Mr. Page's experiments showed that the curve of normal sugar excretion is remarkably constant with a slight upward trend from morning to evening, and a low level during sleep. During the hour following meals there occurs a sharp rise which is in no way dependent upon the quantity or quality of food ingested. Great variations and remarkable constancy of sugar excretion may be found at different times in the same individual. Mr. Page fixed as the upper limit of a normal curve 110 mg. of sugar in the hour. Among his supposedly normal subjects, towards whom no suspicion of glycosuria had ever been entertained, there were some who considerably exceeded this allowance, which leads Mr. Page to the conclusion that the method is likely to prove valuable for the determination of unsuspected glycosuria. It is, however, a little elaborate as a routine test. There can be no doubt, on the other hand, that it will give valuable information during insulin treatment. Mr. Page considers that the lower limit of safety in a patient undergoing insulin treatment is 30 mg. per hour. Fortunately the amount of insulin required to reduce "normal urine sugar" to a dangerously low level greatly exceeds that needed to reduce pathological wastage, but this fact does not excuse the administrator of insulin from taking every precaution to avoid a dangerous hypoglycæmia.

[1] The Journal of Laboratory and Clinical Medicine, July, 1923, p. 631.

[2] Reported in Jour. Biol. Chem., 1921, xlviii., 51.

VIENNA.

(FROM OUR OWN CORRESPONDENT.)

Insulin Treatment in Vienna.

AT a recent meeting of the Vienna Medical Society the insulin treatment of diabetes was discussed, and Prof. Falta described his experiments made in order to obtain the active substance. The animals used were dogs, fœtal calves, fish, and latterly sheep, pigs, and oxen. The results of the treatment are very encouraging. Large doses are necessary, each dose being equivalent to the quantity of insulin required to diminish by 50 per cent. the blood-sugar in a medium-sized rabbit. The employment of insulin is not free from risk; excessive doses produce hunger, fatigue, spasms, loss of consciousness—symptoms best treated by intravenous injections of grape-sugar. Other Viennese observers have also had excellent results with this remedy. Rapid improvement of patients in a comatose condition was seen several times. The excretion of sugar and acetone can be promptly reduced to a fraction of the regular output. Insulin cannot supersede the dietetic treatment of diabetes, but the new method is a most welcome addition to the physician's equipment. Insulin is being prepared in three laboratories in Vienna, as it is too expensive to be imported from abroad. Physicians are agreed, however, that the English product is much better than that hitherto obtainable here. Dr. Pollak pointed out that the increase of weight noted in patients submitted to that treatment is due to water-retention in the tissues, and that all patients benefit by being allowed fat and carbohydrates.

Influence of Diuretics on Water Content of Tissues.

Dr. Saxl has investigated the influence of diuretics upon the tissues in healthy and diseased persons in order to clear up the conflicting evidence found in the literature of the subject. As a rule, healthy tissues are only slightly affected; theobromin, for instance, does not increase the flow of urine in children (Hecht), whilst novasurol is very effective. In œdematous patients diuresis was supposed to be produced by direct attack upon the œdematous tissue. Experiments by Schur show, however, that purin bodies do exert a very definite action on healthy kidneys; Schur thinks that they act chiefly on the kidney and not by mobilising the water contained in the tissues. In a recent discussion on this problem at the Vienna Medical Society all these hypotheses were brought forward; the majority of the investigators agreed that the chief burden is assumed by the kidney. All diuretics should be capable of stimulation of the function of the kidney. The idea that water might be "drawn out" of the tissues cannot now be upheld. It is the vis a tergo which causes large anasarca to disappear under the influence of a diuretic remedy, increased pressure by improved heart action being one of the chief factors. The influence of the nervous system upon the kidney must not be lost sight of,

because the same remedy acts in one case and fails to act in another.

General Systemic Effects of X Rays.

The effects of X rays upon the general condition of patients who had for various reasons received large doses of them were recently studied in Prof. Schlesinger's clinic. In nearly every instance marked debility and malaise appeared similar to that following intoxication, and sometimes so severe as to give the appearance of shock. This condition, expressed by an abnormal distribution of blood and changes in the permeability of the blood-vessels, was quickly improved by hypertonic solutions of sugar, NaCl or Na_2SO_4, this being very similar to improvement observed in actual shock. Further investigations have shown that not only is NaCl largely eliminated from the blood after a strong dose of X rays, but also that the concentration of potassium, calcium, and cholesterin in the blood is profoundly altered, while the blood-sugar reacts sharply. Lymphatic tissue is also severely affected, and the products of this disintegration are no doubt partly responsible for the symptoms of intoxication after X ray application. Every exposure to X rays which penetrate through the superficial layers must, therefore, be regarded as a systemic injury first manifested by the transportation of NaCl from the blood to the kidneys and thence out of the body. One of the organs primarily affected is the liver, which soon shows parenchymatous changes. This organ may be "absolutely insufficient" to deal with the work thrown upon it even by a small quantity of X rays, or "relatively insufficient," if an intensive dose has caused a large amount of disintegration products to be circulating in the system. The liver may thus be seriously affected, not by the rays themselves, but by the metabolic changes caused in the blood. The normal function of other glandular organs may also be seriously hampered after an X ray application to the body, but all evidence points to the liver as the chief sufferer, hence the malaise and prostration so often complained of after X ray sittings. The change in salt concentration is only part, however, of the damage done to the system; it is readily counteracted by giving the patient an adequate dose of NaCl, whilst other damage is not yet easily recognised or treated.

July 31st.

BUDAPEST.

(FROM OUR OWN CORRESPONDENT.)

Treatment of Terminal Hæmaturia.

IN a recent number of the *Gyógyászat*, Dr. Kertész, of Budapest, dealt with terminal hæmaturia as one of the most obstinate symptoms of gonorrhœa. This hæmaturia always occurs after micturition, and results from the strain which serves to express the last drops of urine. The blood exudes from wrinkles formed between the bladder and the urethra, which wrinkles are exposed, about the end of micturition, to a certain tension; their epithelial surface is mostly excoriated, and during the frequent contractions connected with pressure they void a few drops of blood. Methods of treatment hitherto applied—rest in bed and instillation of silver nitrate—are frequently of no avail. Another more efficacious method consists in letting the patient micturate in a half-recumbent position, instructing him when the act is nearly concluded to relax muscular pressure and to press the bladder hard with the hands. In this way the last drops of urine are expressed. This method is very serviceable, often relieving the patient from terminal hæmaturia in a few days.

Neosalvarsan in the Treatment of Chorea.

Dr. János Bókay, professor of diseases of children at the University of Budapest, has lately administered neosalvarsan in severe cases of chorea with excellent results. A striking relief of incoördination a few days after the first intravenous application of neosalvarsan, and disappearance of the intense nervous restlessness in every instance after the second injection—i.e., after ten days—have been observed. The quantity of neosalvarsan given varied; Dr. Bókay used a dose of 1 g. on an average. Up to now, chorea in a child of "middle" age could generally be cured by oral application of some 300 drops of Fowler's solution, with an arsenic content of about 0·12 g. The arsenic content of 1 g. neosalvarsan is 0·217 g. Prof. Bókay attributes the rapid effect of the latter not to the greater arsenic content, but to the fact that the arsenic in the neosalvarsan is organic and also lipotropic, making possible the penetration of the arsenic into nerve tissue.

Death of an Eminent Ship's Surgeon.

Dr. Francis Gáspar, who died recently, was well known for his books of travel, and served about 40 years with the late Austro-Hungarian marine as a ship's surgeon. He published his experiences in two large works, "Seven Years on the Sea," and "Forty Thousand Miles with Steam and Wind"—i.e., 200,000 English miles—both of which were translated into several foreign languages. After the war, when the Austro-Hungarian marine service disappeared, Dr. Gáspar accepted the offer of an important post in the Hungarian Public Health Department, but found the work distasteful, and became embittered to such an extent that he committed suicide.

A Wheat Currency.

The Hungarian doctor's livelihood at the present time is precarious, especially in the provinces, where a village practitioner's annual income rarely exceeds 100,000 kronen (at present equivalent to something over 45*s*.). The instability of the economic situation has led the local branch of the Medical Association at Szabolcs to introduce a new system of payment of medical fees. The fee for a consultation is to be the current price of 5 kg. of wheat. Even this very moderate fee will be reduced for officials, clerks, &c., whose salaries do not vary with the fluctuations of the price of wheat.

Census Figures.

The Central Statistical Bureau has just published the data yielded by the last census. Hungary is stated to have had 7,980,143 inhabitants in 1920, which figure represents a 5 per cent. increase against 1910 in the present Hungarian territory. This increase of population, despite the tremendous loss of life in the war, is due to the influx of people from the lost portions of the old Hungarian kingdom. Another result of the war was that the male population numbered 3·8 millions and the female population 4·1 millions. The number of widows in the country was 25 per cent. larger than in 1910, and the number of divorces had increased by 55 per cent.

Child Welfare Exhibition.

On July 16th the first Hungarian Child Welfare Exhibition was opened in Budapest. The exhibits were divided into various groups—hygienic, educational, &c. A large collection of apparatus for the correction of deformities, a number of skulls of children from the pathological museum of the pædiatric clinic, a series of models illustrating the different infections of childhood, and statistics relating to children's accidents were among the most interesting features of the exhibition.

July 27th.

THE LATE DR. J. R. STENHOUSE.—The death occurred at St. Andrew's-place, Lewes, on August 10th of Dr. John Robert Stenhouse at the comparatively early age of 52. Dr. Stenhouse received his medical education at Guy's Hospital, becoming M.R.C.S., L.R.C.P. Lond. in 1894, and B.S. Lond. in 1895. He secured the diploma of Public Health in 1904 and obtained the degree of M.D. (qualifying for medal) in 1907. Dr. Stenhouse held a number of appointments at Lewes, including those of school medical officer and medical officer of health, but ill-health compelled him to relinquish the latter post some years ago. He was an occasional contributor to the medical press.

BRITISH MEDICAL ASSOCIATION.

ANNUAL MEETING AT PORTSMOUTH.

(*Continued from p. 304.*)

SECTION OF MEDICINE.

WEDNESDAY, JULY 25TH.

IN opening the discussion, before a crowded audience, on

Diabetes,

the President, Sir THOMAS HORDER, said that the committee of the section had had no difficulty in choosing the subject of the first debate. If insulin were not discussed our patients would be much surprised, and with good reason, and they would probably assume, and again with reason, that we were quite satisfied that in insulin we possessed a "cure" for diabetes and that nothing more need be said on the subject. Many persons had already assumed this in view of certain generalisations which, if they did not carry the hall-mark of authority, had not been authoritatively contradicted. It was notoriously difficult to control popular ideas about new remedies, and the very fact that such epoch-making events as the discovery of insulin were rare, when they did come, took popular credence further than facts justified or the discoverer claimed. The problem was regarded as already solved, whereas it might well be that insulin would prove to be as great an asset to medical science by assisting the interpretation of obscure phenomena as in the provision of a therapeutic agent. Had not the essence of the problem of diabetes been the almost certain fact that we were dealing not with one biochemical change but with several? Certain cases of diabetes were benefited much less by insulin than were others, and certain would be found not to be benefited at all; this position must be made quite clear in our patients' interest.

Some very fundamental questions, Sir Thomas Horder continued, will be discussed, and we shall hear the opinion of men well qualified to speak upon them. Will some of the cases of diabetes that show such striking improvement under treatment by this remedy recover their lost power of maintaining a normal blood-sugar so as to "carry on" without its help? Is diabetes necessarily a progressive disease? At what level should the blood-sugar be maintained in order that insulin should be most effective? Will blood-sugar estimations continue to be necessary in every case, and, if so, are either of the rapid methods at present in use practicable and accurate for the general practitioner? Will it be a safe criterion by which to control an increase in the patient's diet to adopt the estimation of urinary sugar? Can any general guide be given as to the best proportions of the main food principles which it is wise to employ in venturing upon an increase of diet when, by the use of insulin and by starvation, the blood-sugar has kept within a normal range for several days, or must each case be regarded as a law unto itself? Is there not a hope that the active principle of insulin may be isolated so that it may be effectively given by the mouth? We shall doubtless hear of the abuse of insulin by the greedy glycosuric and of the undesirable symptoms produced by the use of insulin in cases of renal glycosuria. It would be a vain request to ask that in this discussion some consideration should be given to other aspects of diabetes than those concerned with insulin: the relation of sepsis to diabetes, the ultimate causation of pancreatic cases, the influence of infection and heredity. Insulin is probably the greatest contribution yet made to the study of diabetes. The section extends a very hearty welcome to Dr. Banting, and he will be asked to speak first. If he has anything new to tell us we shall be very interested to hear it. If he has nothing new then we shall like to hear the old story again from his own lips.

Dr. F. G. BANTING (Toronto) said that he and those associated with him in his work thanked the medical profession for the way in which it had received the result of their experiments. He outlined the story of the research which led to the preparation of insulin in quantity. Following ligature of the pancreatic ducts the acinous cells of the gland degenerate, but the islet cells remain intact. They had ligated the ducts in a dog and ten weeks later removed the degenerate pancreas and extracted it with saline. The injection of this extract into a diabetic dog caused a fall in the animal's blood-sugar and it lost its ravenous appetite. The amount of pancreas so obtained was very small. The injection of secretin to exhaust the acinous cells was found to be very uncertain in its results. Up to the fourth month of intra-uterine life the acinous cells in the fœtal calf contain no trypsinogen granules. An extract of this material was found to be very active in lowering blood-sugar. An attempt was then made to extract whole pancreas with some chemical substance which would destroy trypsin but leave insulin unharmed; 82 per cent. alcohol was found to answer the purpose. Since then rapid progress has been made and the product is now protein-free, is non-irritating, and easily standardised. In the laboratory insulin in proper dosage reduces the blood-sugar to normal or less, renders the urine sugar-free, and by its use the life of a depancreatised dog can be greatly prolonged. Insulin also enables the liver to store glycogen. In adequate doses insulin will control all forms of hyperglycæmia.

Clinically there is no fixed method of managing diabetic patients. In Toronto a case, if at all severe, is admitted to hospital for at least three weeks' training and the working out of sugar tolerance. The patient is kept on his usual diet for 24 hours and then upon the "basal requirement diet"; 0·75 g. of protein per kilo body-weight is given to an adult per diem, the remaining calories are made up of carbohydrate and fat. A mild case on this diet becomes sugar-free; if severe the output becomes more constant. If the patient can take 500 calories over and above the basal requirement insulin is not given. The sugar output is of value in estimating the initial dose of insulin. One unit will metabolise from 2 to 2·5 g. of carbohydrate in a severe case and from 5–6 g. in a mild case. As a rule, 5 units may be given to begin with unless the patient is comatose. The dose should be given one hour before a meal once a day. It is advisable to keep the patient sugar-free, as in that state the pancreas tends to produce insulin. In many cases there is evidence of increasing tolerance as a result of treatment with insulin. The frequency of blood-sugar estimation necessary to control treatment is still uncertain.

Dr. P. J. CAMMIDGE (London), after expressing his personal admiration for Dr. Banting's work, said that for many years the name diabetes mellitus had been applied to any condition of glycosuria. It was now possible to determine with considerable certainty whether the symptom depended on failure of the pancreas or was due to other known causes of hyperglycæmia. Clinically the prognosis and reaction to treatment of the various types was different. He had applied the test of "hydrolysis and difference values" of the blood to its sugar content before and after a standard breakfast. In this test the blood-sugar is estimated in one sample and in another the reducing power is determined after being freed from protein and hydrolysed. The latter gives the "hydrolysis value" and the difference between the two is the "difference value." By this means three types have been differentiated, characterised respectively by deficiency of the internal secretion of the pancreas, hyperactivity of the thyroid, pituitary or nervous disturbances, and defects of carbohydrate storage in the liver. Combinations of these types were met with, but deficiency of islets develops in all untreated cases of hyperglycæmia. Insulin may be used in treatment in three ways: as a temporary aid to metabolism in emergencies, to enable a patient to take a diet in excess of his natural tolerance and as a remedial measure. It is not a universal cure for diabetes, but is the most valuable means we have for

controlling metabolic defects due to deficiency of the internal secretions of the pancreas and should not be given indiscriminately to all cases of glycosuria.

Dr. GEORGE GRAHAM (London), speaking on the results of experiments on patients in the medical professorial clinic at St. Bartholomew's, said tolerance could be recovered to a certain extent by resting the islet cells. It was of the utmost importance to make certain that as a result of treatment the blood-sugar was normal in the morning before the daily dose of insulin was given and no carbohydrate beyond that in the vegetables must be added until the morning blood-sugar had been normal for three or four weeks. If the blood-sugar was 0·2 per cent. or 0·15 per cent. the islet cells were overworked and had no chance to repair. In order to produce this a varying dose will be required in different individuals; in some 10 to 15 units a day would suffice, in others 30 to 50 units even twice a day might be required. Blood-sugar estimations were of assistance, but not absolutely necessary; so long as glycosuria occurred they could be dispensed with, but when the urine was sugar-free it was important to make estimations occasionally as there was no other means of telling whether it were 0·10 per cent. or 0·18 per cent. Blood should be collected either before the insulin injection or 12 hours after. It was better to estimate the blood-sugar at once, but the blood might be collected and preserved by the addition of potassium oxalate and one drop of 40 per cent. formalin. Results of treatment in cases of coma were, so far, fairly good; two recovered and one died. It was important to hunt for sepsis in every case; the fatal case had a parotid abscess. In coma 20 to 30 units should be given subcutaneously at once; it was unnecessary to give sugar if the patient was passing much sugar, but if very bad 50 g. of sugar and 60 units of insulin should be given at once, and as much as 140 units may be required in 24 hours.

Dr. J. A. NIXON (Bristol) said he had treated five cases of diabetes with insulin, and spoke enthusiastically, though perhaps prematurely, as to its value. Was a patient any better, he asked, for being sugar-free when he had a high blood-sugar? The patient may gain in weight and well-being, but was he safe? If glycosuria occurred with a low blood-sugar threshold we could make use of a trace of glycosuria as a guide to insulin dosage. Symptoms due to hypoglycæmia were difficult to determine. A man of 40 received 20 units of insulin daily for three days and then suddenly developed partial aphasia; he was given glucose and speech improved the next day, but as he had had angina pectoris the aphasia may have been of vascular origin. Another man, aged 35, receiving 20 units complained of tingling in the legs and swelling of the feet though his blood did not show hypoglycæmia. The "basal requirement diet" was the most practical standard diet (Woodyat formula), which enabled insulin dosage to be adjusted to a diet which was adequate.

Dr. JOHN RENNIE (Glasgow) contrasted the results of treatment of a series of cases under the old, the Allen-Graham, and insulin methods of treatment. An improvement may be expected in the majority treated by the Allen method, but end-results were far from satisfactory. Ten cases treated with insulin showed distinct improvement. To determine the requisite dose of insulin each patient was given a meal of known carbohydrate protein fat content with increasing doses of insulin until satisfactory blood-sugar and urinary-sugar results were obtained, and from this a sufficient dose for an adequate diet was calculated. This method was best suited to chronic cases with low carbohydrate tolerance. There was no experimental evidence to show that insulin was absorbed through the skin.

Dr. E. P. POULTON (London) said that in certain cases a distinct increase of tolerance had been observed after prolonged treatment with insulin.

Dr. O. LEYTON (London) referred to the curative properties of insulin in diabetes of comparatively recent origin and due to pancreatic defect. When there was a probability that damaged islet cells were present an attempt should be made to restore them to health by rest—i.e., giving enough insulin to make blood-sugar below rather than above normal; if symptoms of hypoglycæmia result they may be controlled by the administration of sugar.

Dr. A. P. THOMSON (Birmingham) had observed a definite increase in tolerance in two cases that had previously been vigorously dieted for some time. Blood-sugar estimations were essential when giving large doses of insulin, but treatment can well be carried on without in the average case if the urine were examined frequently and the diet properly controlled. A few estimations were necessary during a preliminary period of standardisation.

Dr. FRANK ROPER (Exeter) related some recent experiences with insulin, and Dr. E. E. WATERS, I.M.S., and Dr. A. CLARKE BEGG (Swansea) took part in the discussion before Dr. BANTING'S reply.

THURSDAY, JULY 26TH.

On the second day the section, under the chairmanship of Dr. J. ODERY SYMES (Bristol), discussed

Heart Disease in Early Life,

its ætiology, prevention, and treatment. Dr. REGINALD MILLER (London) said the matter was of prime importance for the people of England. The subject resolves itself largely into the consideration of one disease, and that is acute rheumatism. In reviewing the progress made in the fight against this disease the chief change in the last 50 years seems to be a reduction in the frequency of its severer manifestations; hyperpyrexia, the most dread of all rheumatic symptoms, seems to be disappearing, and the number of cases of rheumatism sufficiently severe to require admission to hospital is also declining; in the last 50 years the admissions have dropped 50 per cent., according to the statistics of some London hospitals. The incidence of acute pericarditis as judged from the same tables is also declining. Some progress, therefore, appears to have been made, and it is due rather to clinical work than to public health administration; earlier diagnosis and more efficient treatment being in the main responsible. But rheumatism still remains one of the serious infections of this country, and the factors hindering progress are numerous, and may be considered under three headings.

1. *Problem of Rheumatic Infection*—the most important. The modern view is that it is a specific infection producing no sort of immunity against itself. A disease reproducing the same clinical picture again and again must be due to one type or strain of microbes; the histopathology proves the bacteriæmic character of the infection and supports its specific nature. To gain more knowledge as to the influence of the rheumatic environment it might be of service to make rheumatism a notifiable disease, and education of parents and school teachers would further our efforts to get the rheumatic child under treatment as early as possible. As to the specific organism, the view was expressed that it is an alimentary streptococcus, one fact brought forward in support being the isolation of such an organism from the cerebro-spinal fluid in a case of chorea. The action of salicylate was discussed and the view expressed that it exerted a bactericidal action; the effective dose in children is from one to two drachms a day divided into many small doses. As to the origin of the recrudescences of the infective process and reinfection of the rheumatic, early attacks may often be traced to the tonsils and tonsillectomy may do good, but the source of later attacks is often wrapped in mystery. The tests of cure are the loss of the toxic appearance, a gain in weight, and a flat temperature chart.

2. *Problem of Heart Disease in Rheumatic Subjects.*—Heart disease in rheumatism is largely a matter of the severity of the infection and the age of the child; below 12 rheumatism is essentially an infection of the heart. The severe symptoms often develop with a

rush, yet they are nearly always preceded by mild symptoms. The activity of the infection must be subdued by salicylate, while sparing the heart by rest, early diagnosis, and efficient treatment.

3. *Problem of Cardiac Crippling in Rheumatic Heart Disease*—the chronic heart invalid. The heart muscle loses its power of recovery. It is infection rather than mechanical strain that has done the harm; the child's heart never breaks down by mechanical strain alone, and these cases of chronic cardiac disease are the result of repeated infections. In preventing and treating chronic cardiac insufficiency reliance must be placed on the persistent use of salicylate in the hope of preventing recrudescences of infection, the use of digitalis when indicated, and removal of tonsils obviously diseased. Vaccine therapy, even as a prophylactic, in spite of recent reports with *S. viridans* from America, is most disappointing. With children too toxic to react the infection produces no immunity to itself. Sir A. E. Wright's new method of transfusion with immunised blood may be well worth a trial. The provision of prolonged quiet rather than strict rest, correct hygiene, close medical supervision, and some facilities for education should be aimed at. The most urgent problems awaiting solution are: (1) What is the underlying connexion between rheumatism and poverty? (2) What is the origin of repeated relapses and how can they be prevented? (3) How can we give long courses of treatment to our many heart cripples?

Dr. G. A. ALLAN (Glasgow) said that in 1921 53,710 deaths, or 11·7 per cent. of deaths at all ages from all causes in England and Wales, were due to heart disease. Rheumatism accounts for about half to one-third of deaths due to heart disease in a general hospital. In Glasgow, with a population of 1,111,428, the education authority is responsible for 198,304 children, and in routine examination 0·6 per cent. had acquired organic heart disease, and 1·1 per cent. functional heart disorder. In London 4 per cent. of girls and 3 per cent. of boys of 12 years of age have a cardiac disorder. There must be between 45,000 and 50,000 children attending school in Great Britain who have organic heart disease, many of whom are destined to become cardiac cripples before middle life. The percentage of cases doubles during the compulsory school age. Rheumatism was an infection, but an organism did not necessarily have to be seen before it could be fought. Was tonsillitis a rheumatic manifestation, or was the tonsil the site of entry or the home of the organism? Did scarlet fever ever produce heart disease or predispose to rheumatic infection? With our present knowledge some education of parents was possible. Many do not realise a child could have rheumatism. Education of students should be more thorough, and they and practitioners should realise that treating rheumatism by pharmacopœial doses of salicylate is only playing with a serious disease. End-results of rheumatism as seen in general hospitals were very seldom the result of only one attack; cases of pericarditis in a first attack do not as a rule live long. We wanted to know the habitat of the organism and the predisposing factors to the disease. A committee linking up various workers would be in a position to influence medical and lay opinion in the direction of most useful activity. It was proposed that the council of the association be recommended to appoint a special committee to consider the best steps to be taken to combat the grave menace to the community arising from chronic cardiac disease.

Dr. J. G. EMANUEL (Birmingham) said that to a child suffering from organic heart disease the danger is not from over-exertion but from re-infection. Rheumatic carditis demands rest in bed. If no active infection was present a damaged heart required exercising. Rheumatic carditis often ran an afebrile course. Anæmia might be too slight to be a guide, and the same holds for the loss of weight. Physical signs, with the exception of pericardial friction, did not help us to recognise active cardial infection. A pulse-rate over 100 when the child was at rest in bed, especially if not slowed by digitalis, indicated active infection. Re-infection did not take place through the tonsil. Rheumatism in children closely resembles tuberculosis; in both repeated infection took place from existing foci within the body. Salicylate had not diminished the incidence of rheumatic carditis; it relieved pain and pyrexia in this and other conditions. There was a danger in its administration, in that by relieving pain and fever the child might be allowed up too soon. Hospitals, auxiliary to existing general hospitals, were badly required where children might lie until all infection was over.

Dr. CAREY COOMBS (Bristol) protested against Dr. Emanuel's anti-salicylate views in the treatment of cardiac rheumatism. Mortality records of Bristol proved the incidence of fatal cardiac rheumatism to be less than it was; in that city about 80 deaths occurred each year—in each case death might be preceded by, perhaps, ten years' crippledom. He welcomed Dr. Allan's resolution. Many cases of cardiac rheumatism became relatively cured, but the valve was always damaged and liable to become the seat of chronic ulcerative endocarditis. He warmly endorsed Dr. Emanuel's plea for treatment in auxiliary hospitals in coördination with existing teaching hospitals, and thought much might be done at once if Poor-law infirmaries were more readily available for the purpose.

Dr. W. H. W. ATTLEE (Eton) said that in public schools hearts crippled by rheumatism were very rare, but large numbers of functional hearts were met with wherein abnormal signs were found in the course of routine examination but which gave no symptoms. Variation from the normal physical signs in the heart of a rapidly growing boy meant very little in the absence of symptoms. Restriction of games in such cases does harm to the patient, and school life is spoilt to a great extent. He had followed up many cases which had hearts of this kind at school, and none had shown cardiac symptoms since leaving school.

Dr. M. O. RAVEN (Broadstairs) said that fresh air was necessary, and ordinary convalescent homes were too noisy for the treatment of children with heart disease. In rest homes at the seaside one had to decide how long a child was to be kept in order to prevent recrudescence. In New York it was considered that the child was not free until three years had passed without relapse. Of cases treated at Broadstairs 19 had been traced through periods of 18 months; these had remained for periods varying from six weeks to 12 months and were re-examined after living active lives in London for at least seven months. The result suggested that children were subject to relapse in proportion to the shortness of their stay in the country. Every child who ever had symptoms of the rheumatic state should be sent into the country for six to eight months before being re-exposed to the environment in which the disease was originally contracted. Routine rest was always to be deprecated. Rest is needed solely if infection was in the heart. A systolic murmur often disappeared with rest. A diastolic bruit at the apex was very common in children with active heart disease; its first manifestation was a reduplicated second sound which gradually became a mid-diastolic bruit and finally a pre-systolic murmur. On rest the murmur might recede completely. Until change in physical signs has ceased rest must be enforced.

Dr. F. G. LAYTON (Walsall) said that when patients were ordered by a hospital physician to bed for a month on account of rheumatism the general practitioner should be written to and asked to enforce that treatment and the administration of salicylate. What was the evidence that growing pains were due to rheumatic infection? Morbus cordis undoubtedly followed scarlet fever and diphtheria. Heart disease in children was much commoner in the back streets and far more hospital accommodation was wanted.

Dr. C. O. HAWTHORNE (London) emphasised the importance of prophylactic efforts, but did not approve of leaving propaganda work to a special committee and thought it should be done through the general

practitioner. There were two pictures of rheumatic infection, the adult and the child—rheumatism in adults compels rest on account of arthritis, but the non-arthritic rheumatism of childhood did not enforce rest and for purposes of prevention rest must be secured. Leaflets for propaganda purposes were useless.

Dr. A. P. THOMSON (Birmingham) reviewed his personal experience during the last two years in dealing with the problem of the rheumatic child at the Barberville institution in Birmingham—a residential school for cripples wherein some 50 per cent. of the beds were allocated to rheumatic cases. The outstanding clinical difficulties were two: to determine when the cardiac infection had become quiescent and when the child became free from the danger of re-infection. Cases of chorea did better when special educational methods were employed than when they did not go to school. By varying the daily amount of rest he found that one group, if rested for 18 hours in the 24, developed a more rapid pulse than those who were up; if a child was put to bed and his pulse-rate rose he should be exercised. Carditis does not develop when weight is going up. Rheumatic cases should be certified and treated in special institutions in touch with the medical schools.

Dr. E. J. MOFFETT (Birmingham) said that the type of case met with now was milder than in the nineties. As a school medical inspector she found difficulties in diagnosis between the effects of tubercle and rheumatism. The Birmingham mothers are well up in all symptoms of rheumatism. Treatment in the poorer classes was unsatisfactory. Severe cases are admitted to hospital; in less severe cases home treatment was attempted under the supervision of a school nurse. Long periods of continuous treatment are required. Education was important; rheumatic children were backward from prolonged absence from school and should be taught separately in smaller classes on a modified Delton plan. The gap between the curricula between the infant and other schools was too wide.

Sir THOMAS HORDER commented on the significance of the diastolic bruit in rheumatic heart disease, stressing its importance as a premonitory sign of mitral stenosis. Mitral stenosis differed in its evolution from mitral regurgitation; the latter resulted from acute endocarditis, a complication of rheumatic fever, whereas most cases of mitral stenosis followed not an acute endocarditis but a chronic, often afebrile, sometimes subacute, rheumatic process. Mitral regurgitation was a vegetative affair of the cusps; stenosis an infiltration of the valve.

Dr. G. J. LANGLEY (Manchester) said that the recognition of subacute rheumatism in children might be exceedingly difficult. He drew attention to the parallelism between tuberculous and rheumatic infection; both might improve on graduated exercise, though the response to effort of the rheumatic streptococcus and the tubercle bacillus was not the same. The response of the rheumatic patient to auto-inoculation was recognised in the form of a recrudescence of the disease; in tubercle the response was often recorded on the temperature chart.

Dr. C. F. ROUTH (Southsea) commented on the difficulty of tracing the origin of valvular defects in adults who were not aware that they had organic heart disease; a child's heart had an extraordinary recuperative power. Acute rheumatism was very rare in private practice.

Dr. R. WHITTINGTON (Hove) agreed with Dr. Attlee that properly regulated exercises were greatly to be preferred to forbidding games to boys at school.

Dr. MILLER, in reply, said that he thought Dr. Attlee's cases were not infected or poisoned hearts and should be treated on a nervous rather than a cardiac basis. Swimming was not good exercise for functional cardiac disorders. Agreement was general as to the value of salicylate and the necessity of rest for the infected heart, and he was glad that the meeting felt the time had come for some investigation into the rheumatic problem to be made.

FRIDAY, JULY 27TH.

On the third day Dr. G. A. ALLAN was in the chair and Dr. J. J. PERKINS (London) opened a discussion on

Chronic Bronchitis.

The subject, he said, had been chosen at the request of the branches on account of the frequency of these cases in practice and their high death roll—1010 persons per million living (R.G.'s figures for 1920). Dr. Perkins outlined the main predisposing causes—trade and occupation, climate, local pathological conditions especially in the upper respiratory tract, general constitutional factors. There was a distinction between recurrent bronchial catarrh and a single acute attack of bronchitis, which latter may occur without special predisposing conditions, and for which ordinary drugs were useful and vaccines truly curative. When catarrh is constant vaccines were more efficacious in relieving such symptoms as cough or spasm than in curing. Chronic bronchitis was usually secondary to some chronic pre-existing disease, especially of the upper respiratory tract, from which infection of the bronchi by inhalation could easily take place, and the eradication of this underyling condition was essential to the successful treatment of the bronchi. In other cases metabolic conditions were predisposing factors—obesity, overfeeding, and alcoholic excess. Treatment should be continued until a satisfactory convalescence was secured. The open-air habit of life should be preserved or restored and a good plan for the bronchitic was to take his annual holiday in the winter at a place where outdoor exercise is pleasant. The conditions of life in office and home could be improved and heated stuffy atmospheres abolished. A valuable adjunct was respiratory exercises such as those systematised by Mr. C. MacMahon at St. Bartholomew's Hospital, the object of which is to restore and increase the movement of the lungs.

While not undervaluing our present methods of treatment, Dr. Perkins suggested, in conclusion, that important predisposing conditions were often present, the treatment of which was essential; that medicinal measures did not cover the whole ground; that it was important by pure air and exercises to increase the functional activity of the lungs. By removing foci of infection much could be done to prevent catarrh. After an attack much could be done to defend the patient from becoming a chronic bronchitic by enjoining the value of fresh air and exercise of the lung.

Dr. SYMES discussed the bacteriology and vaccine treatment of chronic bronchitis. In the infective varieties reports were universally favourable; cases were never made worse. He was opposed to the use of stock vaccine, and mixed infection being the rule an autogenous vaccine was highly desirable. The exciting organisms were constantly present in the nose and may be isolated by means of a nasal swab when sputum cannot be satisfactorily obtained. The dose must be sufficient to excite a reaction and repeated every five to seven days. In the interval between attacks stock prophylactic vaccine might be given.

Dr. MICHAEL FOSTER (Harrogate) described climatic treatment abroad. The first question was, Can the disease be arrested? Too little consideration had been given to these early cases drifting into lifelong bronchitis, and in these early cases climatic treatment enables habits of coddling to be set aside. Dry air lessens secretion and the diminished air pressure of the Alps dilates the alveoli gently and may be of great value in the winter in early cases; insomnia is generally aggravated by high altitude and the chest wall must not be rigid. Spa treatment afforded another useful method of benefiting early cases. When bronchitis was firmly established the treatment must aim at diminishing secretion—warmth, absence of fog, and dry air, though some are helped by a moist climate when cough was hard and sputa scanty. The Western Riviera was drier than the Eastern; patients with scanty expectoration were probably better off at Rapallo than further East. Egypt is ideal for certain months for cases with profuse expectoration;

asthma cases should not be at sea-level; as small an elevation as 100 ft. might make all the difference as to frequency of paroxysms.

Mr. G. SECCOMBE HETT (London) said that all the cases of chronic bronchitis which he saw were descending infections from the upper respiratory tract. Children with bronchitis usually have a poor air way through the nose and infected tonsils and adenoids. Deflected septum induced nasal catarrh and nasal sepsis. Undue patency of the nose also induced nasal sepsis and a descending infection. Tonsillar infection in adults was less likely to produce bronchitis than nasal infection, but infected teeth should always be removed. Chronic bronchitis was very apt to follow asthma and hay fever because swelling and hypersecretion in the upper respiratory tracts sooner or later allows of infection. Removal of polypi, not in themselves the cause, might relieve bronchitis and asthma by promoting drainage of infected ethmoidal cells.

Dr. A. C. INMAN (London) said that every case of chronic bronchitis should have the sputum examined for tubercle bacilli, and the possibility of a syphilitic infection must always be borne in mind. From a bacteriological point of view the most important organisms were streptococci and *B. friedländer*. In the treatment of the latter infection vaccine was very useful, in the former disappointing. Preventive inoculation should be carried out during periods free from catarrh.

Prof. E. L. COLLIS (Cardiff) wrote that chronic bronchitis contributed so much to sickness and death that it was facile princeps amongst disease, especially in later life. It was probably responsible annually for 80,000 years of invalidity and 28,000 deaths. The death-rate has been falling rapidly since 1870. The disease is induced by wintry weather and atmospheric pollution; a chronic traumatic origin was commoner than an infective. Reduction in morbidity and mortality may be expected to follow (*a*) such social uplift as increases the health of lower grades of society, and (*b*) smoke abatement in industrial districts and great towns.

Dr. F. G. LAYTON said the belief in magic was not yet dead; he had recently come across a boy suffering from pulmonary disease who had a sheep's lung tied to each foot.

Dr. FLORENCE STONEY (Bournemouth) drew attention to dental sepsis as a cause of chronic bronchitis.

Dr. ASTON KEY (Portsmouth) said that one of the great troubles was that the bronchial mucosa was incapable of repair. It was true that many cases of bronchitis arise from obstruction to the nose, and such always succumbed to bronchitis whether the nose were operated upon or not.

Dr. G. B. BATTEN (Dulwich) gave his experience during 37 years of general practice. In the old days chronic winter bronchitis was very common and difficult to treat, the old ladies being overdressed and living in stuffy atmospheres. The introduction of the fresh air treatment of tuberculosis was a great help and these patients were weaned from stuffy rooms and overclothing to fresh air habits, and he now knew of no individual who had habitual winter bronchitis. The important thing is to make the patient live out of doors.

Dr. HYLA GREVES (Bournemouth) said chronic bronchitis was usually a secondary infection rather than a primary one, and constitutional disorders such as gout, arterio-sclerosis, renal disease, and peribronchial tubercle were common underlying factors. In treatment climate plays an important part, and the south of England provided many suitable resorts. The resistance to cold should be gradually cultivated. In acute and subacute cases dry cupping of the bases of the lungs was a valuable agent.

Sir THOMAS HORDER stressed the importance of such underlying constitutional disorders as gout, hyperpiesis, myxœdema, and other endocrine disorders. All cases of bronchitis were not infective; in some infection plays but a minor part, and this explained the success of vaccine in one class and its failure in another. Cases of "mucous diathesis" whether involving the respiratory or alimentary tracts were very difficult to treat. Mucous bronchitis was intermediate between the paroxysmal type (asthma) and the true infective types. It was very important to treat the nervous cardiovascular and digestive systems in such patients.

Dr. DONALD HALL (Brighton) said that he had found autogenous vaccine of value and had had a very mixed experience of operative treatment in the upper respiratory tracts.

Dr. PERKINS, in reply, said that he was satisfied with the result of the discussion. The fact that chronic bronchitis was usually secondary had emerged and the importance of educating people to an open-air life was well recognised.

SECTION OF LARYNGOLOGY AND OTOLOGY.

THURSDAY, JULY 26TH.

THIS combined section met on two days under the presidency of Mr. E. B. WAGGETT. In opening a discussion on

Internal Ear Deafness

Dr. DAN MCKENZIE (London) began by deploring the disparity between our anatomical as opposed to our pathological knowledge of the labyrinth. He described the well-known difficulty of assessing the value of tuning-fork tests in deciding whether the case was of middle or inner ear deafness. With regard to obstructive deafness, nobody had thrown doubt upon the correctness of the inferences to be drawn; but he described a case in which all the classical science of nerve deafness were present in which removal of impacted cerumen was followed by immediate cure of the deafness. Mixed deafness was the commonest type of all, and the affection of the labyrinth in these cases might be merely a functional derangement. The commonest cause of nerve deafness was middle-ear disease; this was a fundamental point and based on statistics from his own practice. The prognosis of nerve deafness with middle-ear disease was grave unless the latter could be arrested. Myxœdematous deafness was a mixed type but happily yielded readily to thyroid medication if begun early. He next dwelt upon the relation between the vestibular reflexes and nerve deafness; they co-existed in acute labyrinthitis, though rarely in a chronic labyrinthitis. He had not seen vertigo in the sudden deafness that occurs in mumps. Vertigo might attend upon almost any type of disease, whereas tinnitus was usually tympanic. Having dealt with noise-deafness, senile deafness, syphilitic and toxic deafness, he concluded by sounding a note of hope provided that means could be found for encouraging pathological research of the type so well exemplified in J. S. Fraser's work.

Thirteen speakers took part in the discussion. Mr. W. M. MOLLISON (London) grouped deafness into qualitative and quantitative. In the qualitative types, obstructive or perceptive, there was a loss either of the upper or lower tones, whereas the remainder of the scale was unaffected. In quantitative ear trouble there was an alteration all along the line; some of the quantitative cases were familial, some toxic, and some due to depression or elevation of sensitivity. Unlike the opener, he had seen vertigo with the sudden deafness of mumps. He mentioned the relation between Paget's disease and nerve deafness, and gave notes and radiograms of a case. He dwelt upon the importance of the lowering of the upper tone limit in diagnosing between middle and internal ear deafness, and of the use of the monochord both by air and bone conduction. He described cases of astounding acuity of hearing in the blind and in certain types of neurasthenics, where whispers could be heard round several corners. Similarly, hypersensitivity of the canals was a clinical entity. Perhaps the canals were getting less valuable to man, and this hyperacuity in neurasthenics was a want of progress in the acquired art of excluding unwanted stimuli. Mr. A. J. M. WRIGHT (Bristol) classified 71 cases from the point of view of ætiology;

those with an obvious cause, such as trauma and syphilis, offered no difficulty. He had seen dramatic improvement with salvarsan given early. Of the remainder two-thirds were females. In these doubtful cases septic foci accounted for a certain number; some were functional, and in these one could usually find a history of some suggestion early in the case. Of the remainder, childbirth, thyroid deficiency, and vaso-motor rhinitis accounted for the majority. He was satisfied that with regard to the deafness due to nerve traumatism by noise, removal of the cause led to an arrest of the progress of the lesion. Sir J. DUNDAS-GRANT, with a facility which can result only from a vast experience, touched rapidly upon a wide range of subjects, among them senile deafness (which, like other senile changes, was not a question of chronology), the explanation of the value of quinine in unilateral labyrinthine vertigo, the value of tuning-fork tests, the question of the effect of pre-existing ear disease in war cases, the use of perchloride of mercury in auditory nerve traumatism, deaf-mutism, and his instrument for the cold air caloric test. Mr. W. J. LEIGHTON (Manchester) said syphilis was not to be overlooked. He emphasised the psychological factor both in ætiology and treatment of deafness, described a labyrinthine storm relieved by inflation, and mentioned the importance of caloric tests in distinguishing between central and labyrinthine lesion.

The PRESIDENT said the speeches had brought out the important point that in a large proportion of internal ear deafness cases evidence of middle-ear disease was present. Many cases of so-called nerve deafness were possibly due to disease in the foramen rotundum. It was important, and perhaps significant, that all cases of hyperostosis of the meatus showed signs of deafness of the internal-ear type. He had not found during three years with an army "soaked with quinine" any chronic deafness caused by quinine or by malaria, and he had some doubt as to the existence of deafness due purely to such causes.

A concise and workmanlike paper was read by Mr. E. D. D. DAVIS (London) upon

Retrobulbar Neuritis of Nasal Origin.

He tabulated 54 carefully worked out cases, in four only of which he had been able to prove the existence of sinusitis. In these there was gross evidence of the trouble, and he deprecated any attack upon the sinuses in the absence of very definite signs of suppuration. The neuritis was wont to wax and wane with or without treatment, which made it difficult to accept accounts of cures. Sir STCLAIR THOMSON (London) agreed with Mr. Davis, and condemned a tendency in some countries to operate upon sinuses without evidence of disease, simply because improvement had followed such steps on occasion. Progress in surgery must be on surer foundations than this. Dr. RITCHIE RODGER (Hull) and Mr. SOMERVILLE HASTINGS (London), on the other hand, had seen dramatic improvement after opening sinuses apparently healthy, and ascribed a larger proportion of cases to sinus trouble.

The morning ended with an interesting paper by Mr. H. D. GILLIES (London) on the

Surgical Treatment of Nasal Deformity

with special reference to the nose of tertiary syphilis. His lantern slides bore convincing testimony to the advance he has made in this field, by the introduction of a two-stage operation. The first stage consists in the intranasal incision of the scar which anchors the remaining nose to the pyriform opening. This release enables the nose to be pulled down into a normal position, the resulting large raw area on its deep surface giving a measure of the loss of lining that has occurred. The replacement of this loss by Thiersch graft is achieved by his modification of the Esser inlay, and permits the second stage—of cartilage grafting—really to rid the patient of the "syphilitic" appearance. In a depressed fracture the cartilage graft may be inserted without the preliminary stage.

The afternoon was pleasantly spent in a visit to the Portsmouth Eye and Ear Hospital, where Mr. C. A. SCOTT RIDOUT showed a series of cases.

FRIDAY, JULY 27TH.

In opening a discussion on

Spasm of the Larynx,

Sir STCLAIR THOMSON, after a definition of terms, briefly reviewed the anatomy and physiology of the parts concerned and began by classifying the known causes of spasm. He emphasised throughout the importance of psychological factor in intensifying and even originating spasm, and mentioned that in his long experience he had not had occasion to perform tracheotomy, though he was far from condemning the procedure where the strain on the heart was obviously too great. He was convinced that whooping-cough in adults sometimes was the cause of spasm (an original observation this) and quoted cases due to gout, morphia-habit, and tabes. Like most of his hearers, he had found difficulty on occasion in distinguishing between abductor paresis and adductor spasm, but was able to indicate clinical methods of solving the difficulty. Having touched upon Semon's law and spasm in anæsthesia, laryngismus stridulus, hiccough, and epilepsy, he concluded by summing up the lines of treatment at our disposal. The problem, as ever, depends upon diagnosis, and in each case a most exhaustive examination was necessary to ensure that we were not treating a case of paresis by sedative methods.

Sir J. DUNDAS-GRANT drew a very definite distinction between laryngismus stridulus and laryngitis stridulosa, the latter condition being the same as croup and being found in rickety children. Perhaps the deficiency of calcium led to a relative hyper-excitability of the nervous system, and such irritations as adenoids supplied the necessary stimulus. He discussed the laryngeal crisis of tabes and their relief by local anæsthetisation of the larynx. He described laryngeal vertigo, and an explanation of it, and concluded by describing the relief of functional ephonia by faradising the lingual tonsil. Dr. W. J. KELSON (London) said that we must not neglect the fact that the ventricular bands form a false glottis which at times becomes spasmodically closed. He discussed the difficulty of distinguishing between spasm of the adductors and paresis of the abductors. He pointed out that the muscles which close the air-way happen to be stronger than those which open it, and, therefore, the tendency of any nerve irritation is to cause closure. The excitability of the reflex mechanism is greater in children, and especially in sleep, when the cortical centres are depressed. He quoted two cases of fatal spasm of the glottis in children in which a necropsy revealed the signs of rickets only. He described a case of hysterical and prolonged spasm in an adult woman accompanied by a high-pitched stridor both on inspiration and expiration, which was treated by galvanism. Dr. PETER MACDONALD had had unique opportunity of observing intimately a case of recurrent glottic spasm in a woman, and described the means regularly employed to bring an attack to an end. The PRESIDENT, unlike the opener, had had occasion to perform tracheotomy for glottic spasm upon a patient suffering from an aneurysm, and mentioned the danger of delaying intervention too long. Dr. WILLIAM HILL (London) described a dramatic case in which the patient had died as he made the incision for tracheotomy, and discussed the occasional need for artificial respiration after tracheotomy alone had been unsuccessful. Mr. A. J. WRIGHT and Mr. S. HASTINGS also described their experience of the condition.

Mr. LEIGHTON read an interesting paper on

Organotherapy in Ear, Nose, and Throat Work.

There were many conditions in which organotherapy formed a useful adjuvant to other treatment, but it was difficult to lay down rules. He might say, however, that the endocrine organs might act from excess or deficiency of secretion or from perverted secretion.

He mentioned McCarrison's work on the relation between sepsis in the tonsil and other organs and thyroid activity, and quoted cases bearing on it. The pituitary had become increasingly important, and headaches due to a derangement of the pituitary had to be diagnosed from sphenoidal disease. Diabetes, abnormal blood pressure, climacteric deafness, neuroses, hypothyroidism were all common causes of ear trouble and were alike amenable to organotherapy. Mr. HASTINGS inquired as to the dosage of thyroid extract advocated by the speaker.

Short Papers.

Mr. J. A. GIBB (Maidstone) read a short paper upon the Referred Pain of Nasal Sinus Disease. The position to which pain is referred was often disregarded. He would tell us of some cases in which a study of referred pain had been useful in his experience. Other viscera sometimes chose the same areas as did the nasal sinuses, and therefore, of course, one's observation should be backed by a thorough general overhaul. The position of the pain did not always depend on the severity of sinusitis, but might alter slightly if several sinuses were involved. He detailed the areas for the various sinuses and gave cases illustrative of his thesis. Mr. WRIGHT, Mr. E. M. WOODMAN (Birmingham), and Mr. T. B. JOBSON gave cases from their own experience.

In the afternoon Mr. V. E. NEGUS (London) read a paper upon a Newly-described Function of the Vocal Cords. The voices of animals did not necessarily depend on the size of their cords. During independent use of the fore-limbs for such actions as hanging from a branch or bringing them together against resistance the thoracic wall must be brought to rest to give a fixed origin to the muscles attaching the limbs to it. The pressure changes in the thorax are so great that sphincteric muscular action is inadequate to control them, and *valvular* action is brought into play in the larynx. He suggested that the cords closed and that the diaphragm descended a little, leading to a reduced pressure which played an important part in fixing the thorax. He used facts from comparative anatomy in support of his argument, but was inclined to infer too much from the observations made, and to underrate the many other causes which have operated in evolving the present structure of the larynx in man and other animals. His paper was discussed by the PRESIDENT, Sir STCLAIR THOMSON, Sir J. DUNDAS-GRANT, Mr. JOBSON, Mr. WRIGHT, and Mr. RIDOUT.

Sir J. DUNDAS-GRANT read a short paper upon Canfield's Operation upon the Maxillary Antrum, with cases. The method, described in 1908, consists essentially in a preturbinal approach to the sinus, the edge of the pyriform opening being removed subperiosteally until an inspection can be made of the interior. In the original operation, an elaborate flap of mucosa is prepared during the removal of the anterior third of the inferior turbinated bone, with which to line the antronasal communication, but the speaker agreed with Skillern and others in finding this unnecessary. The operation seems one to be reserved for those infrequent cases in which simple infra-turbinal drainage and lavage fail after some weeks to effect a cure. The PRESIDENT, Mr. HASTINGS, and Mr. WRIGHT voiced the general attitude of the audience with regard to leaving plugging in the nose, and it was left to Dr. W. HILL, ever the champion of the under-dog, to side with the reader of the paper as to its occasional necessity.

Dr. W. HILL read a paper upon Butyn as a Local Anæsthetic in nose and throat work. He had found it capable of replacing cocaine in some cases though not in all. It was two and a half times as expensive and was found to be less reliable in some 60 cases. Sir J. DUNDAS-GRANT, Dr. SHEEHAN, and the PRESIDENT also spoke.

After the last paper Dr. EASTMAN SHEEHAN (New York Post-Graduate Hospital) gave a novel demonstration of animated photographs of plastic operations for the relief of deformities of the nose.

DISEASES OF CHILDREN.

THURSDAY, JULY 26TH.

THIS section met on two days. At the first session the President, Dr. EDMUND CAUTLEY (London), being in the chair, a discussion on

Acidosis and Alkalosis in Children

was opened by Dr. P. J. CAMMIDGE (London), who said that the old idea of acidosis, in the sense that the symptoms associated with it were dependent upon the presence of unneutralised acid products of abnormal metabolism in the blood, had had to be replaced by a new conception. The normal faintly alkaline reaction of the blood was maintained constant by buffer substances which could deal with a large quantity of acids or alkalies without the reaction of the fluid being altered. The entrance of acid products into the circulation decomposed some of the bicarbonates and produced a relative excess of carbon dioxide which was then excreted by the lungs. Normally the bicarbonate was quickly replaced, but under pathological conditions the alkaline reserves might be depleted and the proportion of bicarbonate permanently diminished. Such symptoms as air-hunger would ensue, and finally death. Acidosis, then, was a condition in which the concentration of bicarbonate in the blood was reduced below the normal level. Theoretically acidosis might arise by introduction from without of a large quantity of mineral acid, by abnormal formation of acids within the organism (diabetic coma), defective elimination of excretory products (interstitial nephritis), or by excessive drain of bases as in profuse diarrhœa. Alkalosis would occur with excessive intake of alkaline bases. A similar condition might arise should there be an abnormally small amount of acid formed in the metabolic cycle, but of this there was no convincing example. An increase in the alkaline reserve occurred during gastric digestion when acid was excreted into the stomach. Finally it could be brought about by excessive elimination of CO_2 as in voluntary forced breathing. The speaker illustrated his points by reference to cases of diabetes and cyclic vomiting in children.

Dr. RUTH CONWAY VERNEY (Edinburgh) read a paper on the reaction of the blood in children. By observing the hydrogen-ion concentration in relation to the tension of free and of combined CO_2 it was possible to get some idea of the factors controlling the acid-base balance. Among these factors the blood-buffering power was of great importance. She wished to emphasise the value of protein base salts as buffers. Of these hæmoglobin compounds were the chief. She explained the way in which this buffering action of hæmoglobin was brought about. The results which she had obtained by blood estimations in normal children and in those with anæmia confirmed this. She had also studied the blood of children with post-operative acidosis. She hoped to build up a method by which a prognosis could be given as to the likelihood of acidosis occurring in a child about to undergo operation.

The PRESIDENT said that there was still a certain confusion in his mind as to the differentiation and effects of acidosis and alkalosis. Could ketonuria occur without acidæmia? If it could exist with alkalæmia, as some speakers had observed, it implied that imperfectly desaturated fatty acids were circulating in a blood in which there was an excess of alkaline bases.

Dr. E. P. POULTON (London) had listened with admiration to Dr. Cammidge's exposition of a difficult subject, but he did not agree with him on certain points. Although three years ago the speaker had himself suggested the classification used by Dr. Cammidge he now preferred to do away with the terms acidosis and alkalosis, and substitute "acidæmia" and "alkalæmia" for an increased or diminished hydrogen-ion concentration in the blood. He protested against the theory first put forward by Pavy, and revived by Dr. Cammidge, that coma was due

to an inability of the blood to transport CO_2 from the tissues. Dr. Poulton spoke of the association of alkalæmia with tetany and described that form of tetany which is brought about by forced breathing. Possibly it was not the alkalæmia itself but some alteration in the balance of metallic ions which brought on the condition. He mentioned a case that had tetany from a gastro-colic fistula through which valuable HCl was passed in the stools. Cure followed the closing of the fistula. J. S. Haldane had shown that the ingestion of large doses of ammonium and calcium chloride caused an increase of fixed acid in the blood. This explained the success of these drugs in the treatment of tetany. In two cases of acute rickets at Guy's, Osman and Bayers had found a marked fall in the plasma bicarbonate. He considered, however, that diminished plasma bicarbonate was an accompaniment and not the cause of rickets.

Dr. ERIC PRITCHARD (London) agreed that the view that acidosis and ketosis were the same obscured the real significance of acidosis. Health in children depended more on the extent of the alkaline reserve than on any other factor. The fæces were a very important source of elimination of metabolic products. Where the stools contained much fat, as in rickets, bases were excreted in combination with fatty acids and the alkaline reserve was thus rapidly depleted. The fatty acids in the fæces might be due to unabsorbed fat, or they might be produced in the blood, neutralised, and then excreted by the intestine. Defective oxidation was one of the causes of the appearance of fat in the fæces and of depletion of the alkaline reserve. It was usually due to overfeeding and to absence of fresh air and sunlight.

Dr. CATHERINE CHISHOLM (Manchester) said that in her experience acidosis occurred frequently in pneumonia, and the disease often responded quickly to large doses of alkalies.

Dr. CAMMIDGE briefly replied.

Colonel R. J. BLACKHAM, R.A.M.C. (retd.), read a paper on

Cows' Milk in Infant Feeding.

Unfortunately, he said, breast-feeding was not always possible and then cows' milk was the most practical substitute. The best form in which to give cow's milk was, however, a matter on which there was considerable difference of opinion. Raw milk was advocated by some, but it was dangerous on account of the bacteriological infection it could engender. The casein of one animal was, to an appreciable extent, toxic to the offspring of another animal. Heat caused an albumin to lose its individual characteristics and thereby diminished its toxic action. He endorsed Prof. Marfan's saying: "Cows' milk is better raw than cooked for calves and better cooked than raw for infants." He discussed the advantages claimed for condensed and dried milks. In his experience infants reared on the former were fat, pale, and often listless. Milk dried by the spray method had the advantage that it formed a curd like that of human milk. It was constant in composition, contained most of the vitamins, and was not liable to contamination.

FRIDAY, JULY 27TH.

Summer Diarrhœa.

Dr. DAVID NABARRO (London) opened the discussion. He gave a review of the work done by bacteriologists, and of his own observations in the cases which he had studied with Dr. D. H. Paterson in 1921. In every epidemic the organisms found had been very variable. Even when the same bacillus was isolated from a group of cases, its characters were apt to change, and many subgroups were identified. Some bacteria, such as Morgan's No. 1 bacillus, were admittedly present in a large percentage of the cases, but they were also present in the fæces of normal children. It was impossible to assign any one of them as the cause of the disease. In America dysentery bacilli had been isolated in a number of cases which clinically showed blood and mucus in the stools. Similar cases had also been recorded in England, but in this country they formed a very small minority. He had therefore come to the conclusion that summer diarrhœa was not an infective disease in the strict sense of the word. The primary cause was not bacteriological but nutritional. He agreed with the dictum of Pfaundler that the children sicken "ex alimentatione," and that they died "ex infectione." Exposure to heat or cold, bad air, over-clothing, and improper feeding paved the way for bacterial infection. At the same time there was probably an increased virulence of the organisms concerned. The incidence of summer diarrhœa had decreased considerably of late years, and he hoped that the disease might soon become a thing of the past. The work of welfare centres in teaching mothers how to clothe and feed their children, the reduction of flies in cities, and the use of dried milk were all contributing towards this end.

The PRESIDENT said that Dr. Nabarro had raised many interesting points. He himself thought that summer diarrhœa was infective. In his hospital, although the cases were nursed like typhoid, the disease sometimes spread in a ward from one child to another. The infection in these instances was probably carried by flies. Some of the most severe toxæmic cases he had seen had begun in well-nourished children. In them a predisposing state of nutrition did not appear to have had anything to do with it. He considered that the disease was infective, but that many different organisms were involved.

Dr. D. H. PATERSON (London) pointed out that true summer diarrhœa occurred in only a small proportion of children who had diarrhœa in summer. The Americans distinguished between fermentative and infective diarrhœa according as to whether the stools contained blood and mucus or not. In his series at Great Ormond-street, out of 149 only four had shown blood and mucus. Fifty per cent. had a history of dyspepsia, the other half were fat and over-fed. In such children a spell of hot weather might bring on an acute intestinal upset. If they were taken off food altogether, acidosis was likely to supervene. Most of the cases of diarrhœa were due to bad feeding and mismanagement. Only a small minority were the result of a specific organism. In proof of this he maintained that a diet in which fermentation was reduced to a minimum was the most successful in treatment.

Dr. BERNARD MYERS (London) followed Finkelstein's classification of nutritional disorders. Excess of sugar and fat was a common cause of intestinal fermentation. Treatment in these cases consisted in reducing the sugar and the fat in the food. Protein was well tolerated. Some cases were nutritional, some infective; the treatment of the two conditions was different.

Dr. CHISHOLM supported the infective theory. The decline of the disease was due to welfare work and to the care taken in cities to prevent the spread of infection.

Dr. E. P. BAUMANN (Johannesburg) said that we had hitherto made a mistake in considering that all cases were infective. Some had a nutritional basis. We must not, however, go to the other extreme. The mode of onset would differentiate between the two types. Finkelstein fed his cases on buttermilk or whey; he seldom starved, never for more than six hours. Buttermilk had the advantage of being a food rich in water and salts.

Dr. G. B. SWEET (New Zealand) said that he believed in Dr. Finkelstein's treatment, but protein milk was difficult to prescribe in general practice. He had obtained considerable success in treatment of cases with dried skim-milk. It was simple to use, free from germs, and contained very little fat. It was the fat in the food which was the chief source of trouble.

Dr. PRITCHARD laid stress on the reaction of the fæces as a guide to treatment. In fermentative

diarrhœa the stools were acid, when there was proteolytic decomposition they were alkaline. Buttermilk was merely a coarse method of introducing the lactic acid bacillus. He preferred to give lactose with lactic acid bacilli when the stools were alkaline, and protein milk when there was acid fermentation. Indiscriminate treatment with protein or sugar solution was equally unsatisfactory. Instead of buttermilk he used a solution of pure casein. Saline was preferable to whey when salts were required. He agreed with the majority of speakers that cases might be nutritional or infective. Children who had been fed on carbohydrates suffered most in an epidemic.

Dr. NABARRO and Dr. PATERSON replied to the discussion.

Dr. HUGH ASHBY read a paper on the

After-Results of Abdominal Tuberculosis in Children.

He laid stress on the difficulty of arriving at a certain diagnosis. It was important to exclude cases of rickets or dyspepsia which might closely resemble tuberculosis. Resistance to tuberculosis in early life was at its minimum. Cases under 1 year were practically always fatal, but the prognosis improved with the age of the child. The disease was most common at the age of 3 years. The source of infection had been a matter of considerable dispute. It had been stated that in 50 per cent. the disease was bovine, but in his opinion the majority of cases were due to human infection. With regard to the after-results in a series of 250 cases which he had been able to follow up, 56 per cent. were cured, 8 per cent. were doubtful, and 36 per cent. had died. These statistics showed the seriousness of the disease in children. In the cases which had recovered the large majority had grown up and kept perfectly well, a few had a tendency to colic and to looseness of the bowels. In some a mass of calcified glands could be felt in the same situation as the former enlarged glands, but they caused no trouble.

Dr. E. A. COCKAYNE (London) commented on the absence of after-effects. He also had felt calcified nodules which produced no symptoms.

Dr. PRITCHARD did not agree that abdominal tuberculosis under 1 year of age was invariably fatal. During the last ten years he had treated a number of children who had been infected by tuberculous mothers. Early diagnosis was made by means of tuberculin injections. In his series there had only been one death. Treatment by tuberculin had been very successful.

Dr. SWEET had obtained very good results in his cases by tuberculin treatment.

Dr. E. S. MOLYNEUX (Leamington) read a paper on the treatment of tuberculous cervical adenitis by radium. The treatment was painless and safe provided the technique was carefully carried out, and he had obtained a cure in nearly every case. Recurrence was rare. Caseating masses of glands, suppuration, and the presence of old sinuses were no bar to treatment. No scar was left unless suppuration had already occurred.

EXHIBITION OF INSTRUMENTS, DRUGS, FOODS, AND APPLIANCES.

(*Concluded from p. 306.*)

FOOD PREPARATIONS.

Foodstuffs and food accessories were represented by a large number of separate exhibits. [4] Bantam Products Ltd. (Farnley, Leeds): showed a preparation consisting of the soluble portion only of the coffee beans, the woody fibre having been removed; by this means a cup of fresh coffee of any desired strength can be instantly prepared with hot water alone, a 1*s.* 6*d.* tin providing 36 ordinary cupsfull.—[10] Food Products Ltd. (11, Queen Victoria-street, London, E.C. 4): a series of bovo-lactin foods, devised and elaborated by the late Dr. E. C. Hort, consisting of calculated amounts of animal protein, hæmoglobin, milk solids, and carbohydrates. Bovolactin essence contains, per cent., protein 30·4, fat 0·2, ash 18·8, moisture 23·3, carbohydrates and extractives 27·4.—[46] Bovril Ltd. (148, Old-street, London, E.C. 1): meat extract containing fibrin and albumin in concentrated form, with a special invalid preparation more highly concentrated and devoid of seasoning. Attention was directed to the giving of half a pint of bovril before administration of an anæsthetic for the avoidance of post-operative sickness.—[49] Cadbury Bros., Ltd. (Bournville, Birmingham): an exhibit of Bournville cocoa and Bournville chocolate conforming to the highest standards of purity and uniformity.—[27] Food Education Society (329, Vauxhall Bridge-road, London, S.W. 1): a selection of literature, non-dogmatic and philanthropic, to educate the public in matters of food, cookery, and health; leaflets on diet for brain workers, aids to fitness, the importance of fat, how to choose sugar and others.—[53] Wm. Gaymer and Son, Ltd. (Attleborough, Norfolk): various brands of Gaymer's cyder, including the quality known as "dry," prepared from Norfolk apples.—[75] Glaxo (J. Nathan and Co., Ltd., 56, Osnaburgh-street, London, N.W. 1): full-cream, three-quarter-cream, and half-cream standardised dry milks for infants and adults, the milk being dried by a process proved to be non-destructive of the accessory food factors; attention was called to the timely use of glaxo in hot weather as a prophylactic against epidemic gastro-enteritis.—[50] Mead, Johnson and Co. (40, Lexington-street, London, N.W. 1): dextrines and maltose combined with cows' milk and water to form a complete diet for infants. No feeding directions accompany the packages, the doctor being left free to regulate the diet according to individual need.—[59] Horlick's Malted Milk Co. (Slough): an easily digested and highly nutritious diet for invalids and convalescents and a complete food for infants, filling a special need in Red Cross work, for preparation requires no cooking, the powder being simply briskly stirred into hot or cold water. Tablets are also available.—[76] Oxo Limited (Thames House, London, E.C. 4): Oxo fluid beef, being a concentrated form of stimulating extractives; Hospital-Oxo for invalids, peptonised and unseasoned; Lemco pure unseasoned beef extract; and the well-known Fray Bentos food products.—[16] Prideaux's Pure Casein Co., Ltd. (16, Southwark-street, London): the Dorsella milk food for babies and nursing mothers, a full-cream dried milk powder, prepared under approved conditions in Dorset. One pound cartons are supplied in bulk to welfare centres at 1*s.* 6*d.* in winter, 1*s.* 3*d.* in summer; also "casumen" pure milk casein containing 93 per cent. protein, and whey and buttermilk powders.—[84] Stowers (58, Bancroft-road, London, E. 1): cordials prepared from Jamaican and Dominican cultivated limes and from pure lemon juice with addition of cane sugar only, attention being called to the presence of vitamin A and the value of such preparations as antiscorbutics.—[22] Thew, Hooker and Gilbey, Ltd. (Buckingham): various milk products, including Hooker's malted milk and Hooker's malted milk tablets.—[37] Trufood Ltd. (Lever House, Blackfriars, London, E.C. 4): full-cream dried milk, prepared at the Creameries, Wrenbury, Cheshire, and readily reconstituted in cold water; also Humanised Trufood, with part of the casein withdrawn and cream and lactose added; also Secway, a sweet whey in powder form.—[73] Virol Limited (148, Old-street, London, E.C. 1): a preparation rich in marrow and beef fats, containing malt extract, eggs, and lemon syrup, for use in cases of wasting, rickets, and malnutrition; virolised milk is held to promote sound and natural sleep. Also virolax, containing 60 per cent. liquid paraffin in finely divided form acceptable to children and adults.—[39] Vitmar, Ltd. (Callard's Vitamin Foods, 74, Regent-street, London, W. 1): a food adjunct of high caloric value and containing vitamins A, B, and C, recommended for infants and growing children as well as a galactogogue for nursing mothers.

MEDICINAL AND MINERAL WATERS.

[15] The Apollinaris Co., Ltd. (4, Stratford-place, London, W. 1): Apollinaris, the pure natural sparkling mineral water bottled with it own CO_2 gas; Apenta, a natural aperient water for cases of habitual constipation and biliousness; Vittel, a diuretic mineral water for the arthritic and gouty.—[80] Bath (Mr. John Hatton, Director of Baths): an exhibit sent by the corporation, consisting of photographs of the bathing establishments and the chief features of interest at this inland spa.—[71] Buxton (Mr. H. L. B. Pitt, General Manager): an exhibit of official handbooks and of the waters for sale in bottle form from this mountain spa, 1000 feet above sea-level.—[79] Droitwich (Mr. J. H. Hollyer, Director of Bathing Establishments): setting out the characteristics of the climate in summer and winter of England's brine-baths spa, the character of the waters, and of the attractions offered.—[72] Harrogate (Mr. F. J. C. Broome, General Manager): unique in its diversity of springs, with 87 waters of various characteristics collected under chemical and physical control.—[70] Ingram and Royle, Ltd. (45, Belvedere-road, London, S.E. 1): samples of imported natural mineral waters, salts, and pastilles, including Vichy-Célestins, Contrexéville-Pavillon, Evian-Cachat, Hunyadi-János, and 20 others.

MICROSCOPES AND SCIENTIFIC APPARATUS.

[1] J. W. Atha and Co. (8, Southampton-row, London, W.C. 1): showed Zeiss microscopes, with accessories including the photographic ocular "Phoku" with continuous vision, and an apochromatic objective "X" for dark-ground work. [7] C. Baker (244, High Holborn, London, W.C. 1): various types of microscope from the R.M.S. designed for the highest research work and photomicrography down to the Advanced Student's Microscope; also Greenough's binocular and universal models.—[8] Chas. Hearson and Co., Ltd. (14, Princes-street, London, W. 1): a large selection of bacteriological, pathological, physiological, botanical, and chemical apparatus, including Dreyer's new fat-extraction bath for tubercle antigens.—[35] Kodak, Limited (Kingsway, London, W.C. 2): some interesting results of the Eastman panchromatic film which differentiates between yellows and reds and admits of any degree of contrast when used in conjunction with a Wratten filter; also developing tank outfits and dark-room accessories for X ray work.—[61] Rayner and Keeler, Ltd. (Kemp Town, Brighton): a variety of lenses and ophthalmological instruments including the Edridge-Green lamp and card tests, and various new types of lens, such as the lenticular deep concave.—[30] Short and Mason, Ltd. (Aneroid Works, Walthamstow, London, E. 17): the Tycos sphygmomanometer, accurate and portable, a practical instrument for determination of the diastolic, systolic, and pulse pressures.—[25] The Tintometer, Limited (the Colour Laboratories, Salisbury): Lovibond's colour scale and tintometer for the measurement and registration of the colours of gases, liquids, and solids; also Dr. Corbet's radiometer for the accurate measurement of colour changes in Sabouraud pastilles.

SUNDRIES.

[57] The Cellular Clothing Co., Ltd. (72, Fore-street, London, E.C.): showed Aertex cellular clothing for health and comfort, and a selection of red garments cutting off actinic rays for use in the tropics.—[60] Hoskins and Sewell, Ltd. (Bordesley, Birmingham): special beds and bedstead equipment for hospitals, sanatoria, and open air treatment, including the patent wheeling spinal stand, the "silent night" hospital mattress, and the Alton sunshade.—[51] Ronuk, Ltd. (Portslade, Sussex): materials and appliances employed in the preparation, initial polishing, and maintenance of flooring and other interior woodwork.

MEDICAL AGENCIES.

[32] Mr. W. S. Atkins (43, Bedford-street, London, W.C. 2): agent for medical tranfers and for permanent non-cancellable sickness and accident policies specially devised for the medical profession.—[64] The Medical Insurance Agency (429, Strand, London, W.C. 2): founded in 1907 to advise medical practitioners as to contracts most suitable to their needs and to obtain for them policies on the most advantageous terms consistent with secure protection.—[21] The Medical Sickness, Annuity and Life Assurance Society, Limited (300, High Holborn, London, W.C.): founded in 1884, as a mutual society confined to members of the medical and dental professions, for insurance against sickness and accident on a permanent contract basis.

BOOKS AND OFFICE ACCESSORIES.

[18] W. H. Barrell, Ltd. (112, High-street, Portsmouth): showed a comprehensive exhibit of portophones, typewriters, loose-leaf ledgers, dictographs, and the kardex visible record system, specially recommended for clinical reference.—[77] H. R. Ellis (9, Lovell's-court, London, E.C. 4): medical, surgical, veterinary, and dental books, very complete on the side of psychology and allied subjects.—[31] The Hammond Typewriter Company, Ltd. (75, Queen Victoria-street, London, E.C. 4): the multiplex machine, capable of writing in every language or style of type and in which the turning of a knob suffices for emphasis or special announcement with italic or other type. The machine is fitted with special medical and chemical characters and miniature type for writing out small labels.—[26] H. K. Lewis and Co., Ltd. (136, Gower-street, London, W.C. 1): a classified exhibit of new books in many departments, including those of the Cambridge University Press, and a selection of medical stationery, case-books, loose-leaf ledgers, card-index systems, and rubber-stamp diagrams.—[5] Minty (36, Southampton-street, London, W.C. 2): the Oxford Varsity sectional book-cases without metal fittings or projections and both dust- and damp-proof.—[54] Oxford Medical Publications (1, Bedford-street, London, W.C. 2): a complete set of text-books and works in medical, surgical, and general science.—[24] Stanley Phillips (45, Brondesbury-road, London, N.W. 6): an eclectic selection of recent publications in every branch of medicine, surgery, and allied sciences, including year-books of general medicine, surgery, and special subjects, and Meyer's Medical Dictionary in eight languages.—[62] L. L. Waters and Co. (55, Commercial-road, Portsmouth): office furniture of British manufacture made by Messrs. Frank Corke and Co., Southsea, also the Doctor's National Insurance Panel Card Index Cabinet.—[74] John Wright and Sons, Ltd. (Bristol): an excellent selection of recent publications, including indexes of differential diagnosis, prognosis, and treatment; the Medical Annual, a year-book of treatment and practitioner's index; and the medical practitioner's card-index system for account keeping.

The Services.

ROYAL ARMY MEDICAL CORPS.

Maj. D. L. Harding to be Lt.-Col., vice Lt.-Col. C. W. Mainprise (promoted).

The undermentioned Majs. retire, receiving a gratuity: C. Clarke (granted the rank of Lt.-Col.), G. Petit, and C. Ryles.

Temp. Capt. J. J. Walsh relinquishes his commn. and retains the rank of Capt.

The undermentioned Lts. are confirmed in their rank: F. C. H. Sergeant, W. L. S. Cox, and H. A. Gilkes.

TERRITORIAL ARMY.

The undermentioned relinquish their commns. and retain their rank, except where otherwise stated: Majs. E. C. M. Foster and J. Ewing; Capts. A. R. Bearn and H. Buck (granted the rank of Maj.), J. B. Macalpine, G. Stuart, and S. R. Wilson.

Capt. R. G. Michelmore (late R.A.M.C.) to be Capt.

ROYAL AIR FORCE.

G. Clark is granted a short service commission as a Flying Officer.

Correspondence.

"Audi alteram partem."

X RAYS IN EXOPHTHALMIC GOITRE.

To the Editor of THE LANCET.

SIR,—The leading article in to-day's issue of THE LANCET (p. 287), in commenting upon the two very excellent papers of Prof. G. R. Murray and Mr. A. J. Walton on the treatment of exophthalmic goitre, draws attention to the differences of opinion expressed therein as to the value of X ray applications. Mr. Walton has found their use "very unsatisfactory," and were the experience he records to be accepted as an average one I think all would agree with him. Surely, however, there must have been some flaw in the technique in the cases he has met with, where the effect of the rays appears to have been limited to scarring and burning of the skin, and in one case to actually producing a squamous carcinoma, without any changes in the gland or the periglandular tissues sufficient to be appreciated at a subsequent operation. My purpose in writing is not to advocate the X ray treatment of exophthalmic goitre, but that X rays, as applied by Dr. A. E. Barclay and Dr. J. M. W. Morison of this city, by the method described in Prof. Murray's paper, can be made to produce a very definite effect upon the gland without detrimental effect upon the skin I have no doubt whatever. The results in 100 cases [1] are to me, at any rate, fairly convincing, and in the same paper reference is made to a case of Mr. H. Stratford, shown at the West London Medico-Chirurgical Society,[2] in which radiation of the scar and the supraclavicular region for a year after removal of the breast for carcinoma induced such extensive atrophy in a previously healthy thyroid gland that the patient developed myxœdema.

My experience differs from that of Mr. Walton, who has "never found that it—i.e. X rays—makes a future operation more difficult on account of the fibrosis." I have operated upon several cases for Prof. Murray where X ray treatment had been previously applied, and have generally found that periglandular fibrosis is present, sometimes in so marked a degree as to render the freeing of the gland a much more difficult and lengthy procedure than usual. The fibrosis seems, moreover, to extend to the walls of the small arteries, so that the mouths of small vessels which would otherwise have closed automatically when torn across in separating the gland are unable to do so and bleed persistently, necessitating the application of many more ligatures than usual. By prolonging the operation and increasing the amount of handling of the gland and wound I believe that the prolonged use of X rays does increase the severity of a subsequent operation. Unless, therefore, X rays produce material benefit fairly quickly, their application should not be persisted with.—I am, Sir, yours faithfully,

Manchester, August 11th, 1923. ARTHUR H. BURGESS.

A NATIONAL PATHOLOGICAL MUSEUM.

To the Editor of THE LANCET.

SIR,—The cancer problem is now being tackled seriously by the medical profession, and appeal is being made to the general public for funds. May I earnestly urge that the histological side should be more widely and extensively studied? The histological structure of tumours varies so much that it is a matter of the greatest difficulty to follow them and keep them in mind. The great majority of specimens of malignant growths can be recognised quite easily, but there are an appreciable number which the pathologist finds the utmost difficulty in "spotting." Very early malignant growths and malignant changes occurring in a primary innocent tumour cause the greatest difficulty. In my own practice I meet with quite a large number of these cases, so what must be the total number throughout the country? These specimens would form valuable material for the investigation of cancer in its earliest stages and for the training of pathologists. I wish therefore again[1] to urge "the establishment of a national pathological museum, to contain examples of every disease of which examples can be obtained, especially microscopic sections of the different tissues." These specimens should be fully described and accompanied by clinical histories, so that pathologists might turn to them for guidance. At present a pathologist is often unable to give precise information as to what course a case showing an unusual type of tumour is likely to take; sometimes he can get this information from a brother pathologist, generally not. At present pathologists often hold different views as to the nature of certain tumours and their probable course, whether malignant or innocent. Definite information on these points would be obtainable in the records attached to the specimens in a national museum.

If the appeal for funds results in a satisfactory response, I hope the committee already formed will consider the allocation of a sufficient sum to, say, the Royal College of Surgeons, to inaugurate such a museum.—I am, Sir, yours faithfully,

ERNEST H. SHAW, M.R.C.P.

Camden-road, N., August 13th, 1923.

SAILORS AND VENEREAL DISEASES.

To the Editor of THE LANCET.

SIR,—With reference to the annotation on the above subject in your last issue, the National Council for Combating Venereal Diseases wishes to express its very grateful thanks to Sir John Collie for all the trouble he took in getting this Bill, drafted and promoted by it, through the House of Commons. The same Bill in the last Parliament became an agreed measure and only failed of becoming law owing to the sudden dissolution. Sir John Collie was kind enough to undertake to father it at its re-introduction in the present Parliament, and as an agreed measure it passed the House of Commons. The thanks of the Council are also due to Lord Muir Mackenzie who, at the request of Sir John Collie, undertook to shepherd it through the House of Lords. The National Council has been working to obtain this legislation since 1919.

I am, Sir, yours faithfully,

102, Dean-street, W., August 13th, 1923. E. O. GRANT, Secretary.

VILLAGE SETTLEMENTS FOR EX-SERVICE MEN.

To the Editor of THE LANCET.

SIR,—It is to be hoped that Lord Haig's appeal will not pass unheeded. It is because the majority of English men and women do not understand the position of the ex-Service man and are unable to grasp the truth that this apparent apathy exists. May I take the example of the ex-soldier consumptive, whether he be officer or private? What can be more awful than his present position—unemployed and unemployable in the ordinary workaday world? Yet in a village settlement such as Papworth he may not only find health but suitable employment at full wage or salary for the remainder of his days. At the moment the ex-officer has no opportunity of benefiting from such a scheme, being debarred by the regulations of the Ministry of Pensions. Health, employment, hope—all these he could obtain under the village settlement scheme. These men—both officers and men—desire the opportunity to work, to lead a life of usefulness without detriment to their health, but so far this country has given them very little help or encouragement. Capital only is required; the men cease to be a burden to the State once they are settled in the village settlement.

I am, Sir, yours faithfully,

Cambridge, August 7th, 1923. P. C. VARRIER-JONES.

[1] G. R. Murray, Brit. Med. Jour., 1922, i., 907.
[2] THE LANCET, 1921, ii., 1059.

[1] THE LANCET, 1923, i., 218

UNIVERSITY ELECTIONS IN THE NEW DAIL (IRISH FREE STATE).

To the Editor of THE LANCET.

SIR,—A meeting of graduates of the National University, Ireland, adopted as candidates for the representation of the University in the new Dail Mr. Michael Hayes, M.A., Mr. John MacNeill, D.Litt., and Mr. William Magennis, M.A. A committee to secure the election of these candidates was appointed, and in the course of an appeal on behalf of the candidates has stated: Under present conditions stability of government and public security are the supreme necessity. Neither education, public health, nor any other vital service of the nation can be promoted unless stable government and respect for law are assured. Much constructive work awaits the coming Dail. Educational reform, long overdue, must be no longer delayed; no departments more urgently demand improvement than university and secondary education. Hand in hand with educational reform must come a real effort to provide efficient health services for the nation. The committee concludes by stating it confidently expects the vote and support of the electors for the three candidates selected, who share the views expressed in the appeal on their behalf by the Committee of Graduates.

The three candidates selected were the representatives of the National University in the last Dail. Although none of the candidates selected is a member of the medical profession, nevertheless it must be said all of them showed a very keen interest in medical matters in the last Dail, and were always ready to assist the medical profession whenever there was an occasion to approach the Minister of Local Government, who had charge of medical affairs. In the latter respect Mr. Hayes was frequently the means of bringing the profession in the Free State in contact with the Minister of Local Government. It was Mr. Hayes who arranged for and introduced to the Minister of Local Government the deputation from the Irish Medical Committee who waited recently in connexion with the proposed scheme of medical legislation for the Irish Free State. Mr. Magennis also did very excellent work in the last Dail for the profession. He made, on different occasions, eloquent and powerful speeches urging the better treatment of Poor-law medical officers both as regards salaries and pensions, and put himself on every occasion at the disposal of the profession when it was a case of redressing their legitimate grievances. It is hoped that medical graduates of the National University resident in Great Britain and Ireland will not fail to record promptly their votes for the candidates whom they have reason to believe will best serve medical interests and the interests of public health generally in the new Dail.

At the time of writing Dublin University has not selected its representatives for the Dail. It is, however, almost certain that Sir James Craig, M.D., will be a candidate if there is to be a contest, and it is hoped the electors of the Dublin University will record for him their first votes. Sir James Craig was a most successful and popular member of the last Dail; he did excellent work in enlightening members of that body with regard to all matters of a medical nature, and whenever, in this respect, he made representations to the Government he generally succeeded in getting most of what he wanted.

I am, Sir, yours faithfully,

T. HENNESSY, F.R.C.S.I.,
Irish Medical Secretary, B.M.A.

South Frederick-street, Dublin, August 13th, 1923.

PS.—University electors should lose no time in returning their ballot papers when signed and with them the identification certificate; either without the other is useless. The poll will be open for one day only—Monday, August 27th—and as the postal service is still somewhat disorganised, the proper course is to have the necessary papers signed and returned without an hour's delay.

THE IMPERIAL CANCER RESEARCH CAMPAIGN AND THE CANCER PROBLEM.

To the Editor of THE LANCET.

SIR,—Major Leonard Molloy's letter in your issue of August 11th requires correction in one or two essentials. The British Empire Cancer Campaign is distinct from the Imperial Cancer Research Fund; the latter has been in existence for 20 years. The British Empire Cancer Campaign is not yet in existence as an organisation engaged in cancer research. Dr. Molloy says that the Treasury grant to the Imperial Cancer Research Fund is "utterly inadequate." This is an erroneous statement of the case, because the Imperial Cancer Research Fund is not now and never has been in receipt of Government financial support, although several Government departments are represented on its general committees and subcommittees. Permit me to add that I disagree with the implication in Dr. Molloy's letter that the only requirement for success in cancer research is money. It is a libel on men of science in this country to suggest that the trained intellects capable of solving the pathological and therapeutic problems of cancer are here and only waiting for the money to tempt them to engage in these problems.—I am, Sir, yours faithfully,

J. A. MURRAY.

Imperial Cancer Research Fund, 8–11, Queen-square, W.C. 1, August 13th, 1923.

Medical News.

ROYAL COLLEGES OF PHYSICIANS OF LONDON AND SURGEONS OF ENGLAND.—At the Final Examination of the Conjoint Board held during the month of July the following candidates were approved in the subjects indicated, but are not eligible for diplomas:—

Medicine.—B. Abelman, Liverpool; R. S. Anderson, St. Bart.'s; R. G. Anthony, Birmingham; A. J. Boase, St. Thomas's; E. G. Bradbeer, Bristol; A. Broido, Guy's; J. W. Brown, Middlesex; S. G. Brown, London; Mary Buck, Royal Free; F. B. Byrom, London; H. K. Christie, Otago; W. Clark, Charing Cross; R. F. Connell, Middlesex; R. Cove-Smith, Cambridge and King's Coll.; A. B. Cowley, St. Bart.'s; I. S. Cristol, Leeds; G. J. W. Crosby, Cambridge and Univ. Coll.; S. S. Cruden, St. Bart.'s; D. E. Cuffey, Cambridge and King's Coll.; Agnes S. Daniel, St. Mary's; A. B. Davies, Guy's; D. T. Davies, Cardiff; Margaret B. M. Dewhurst, St. Mary's; V. W. Dix, Cambridge and London; I. A. Dubinsky, Halle; H. R. Dutton, Bristol; Winifred P. Edmunds, King's Coll.; Barbara J. Edwards, Birmingham; L. C. Edwards, Cardiff and London; A. C. M. Elman, Univ. Coll.; R. B. Fawkes, Cambridge and Guy's; E. K. A. Firth, Edinburgh and St. Thomas's; H. B. Flooks, Guy's; Theodora M. Fowler, St. Mary's; H. G. Goldwater, Middlesex; H. Graf, Liverpool; F. H. K. Green, St. Bart.'s; R. D. Gross, Guy's; S. A. Gunter, St. Bart.'s; I. E. Harries and J. C. Hewetson, Guy's; G. Hochschild, St. Thomas's; Frances A. Hogben, Manchester; E. G. Holmes, Cambridge and St. Bart.'s; Dorothy M. Howse, Univ. Coll.; Gwynedd Hugh-Jones, Royal Free; L. I. Hyder, King's Coll; E. C. James, Cardiff; S. W. M. King, St. Bart.'s; P. E. M. Lanier, Middlesex; J. J. Lewenstein, Guy's; L. A. N. Line, Birmingham; R. H. Little and R. G. B. Marsh, St. Thomas's; D. G. Martin, St. Bart.'s; Lucy M. T. Masterman, St. Mary's; G. B. Matthews, Charing Cross; T. F. Meyrick and H. D. N. Miller, King's Coll.; G. O. Mitchell, Guy's; G. F. L. Mitcheson, Oxford and St. Thomas's; P. M. Moffatt, Guy's; C. I. N. Morgan and N. Moulson, St. Bart.'s; G. Murray-Shirreff, Bristol; M. Myers, Durham and Guy's; Grace H. Newell, Royal Free; F. N. Newell-Roberts, Guy's; C. E. Newman, Cambridge and King's Coll.; Doris M. Odlum, St. Mary's; F. W. Oldershaw, London; Helen E. D. E. Ornstein, King's Coll.; C. H. Owen, Liverpool; T. G. W. Parry, Guy's; P. R. Peacock, Middlesex; T. W. Preston, H. A. Robertson, and O. F. W. Robinson, King's Coll.; Sybil H. G. Robinson, London; A. B. Rufail, King's Coll.; G. Sanders, Liverpool; A. S. Simpson, King's Coll.; K. H. Southall, Univ. Coll.; T. R. Sutherland, Cambridge and St. Bart.'s; Margaret Swete and Annie Sydenham, Royal Free; W. E. C. Thomas, Cardiff; R. W. H. Tincker, St. Bart.'s; F. C. O. Valentine, Cambridge and London; Kathleen C. Vost, St. Mary's; G. M. Wadsworth, Leeds; H. F. Walker, Middlesex; and Esther Wingate and Isabelle J. Woodhouse, Royal Free.

Surgery.—R. D. Alexander, St. Thomas's; R. H. Amm, Guy's; N. F. Azer, Charing Cross; A. E. Beith, St. Bart.'s; E. M. Bergheim and M. Bersinski, Middlesex; D. R. Blunn, London; C. O. S. B. Brooke, St. Bart.'s; R. W. Brookfield, Liverpool; Lily C. Butler, Royal Free; F. B. Byrom, London; Phyllis M. S. Chalmers, Royal Free; P. S. Connan, King's Coll.; I. S. Cristol, Leeds; E. R.

Cullinan and C. H. C. Dalton, St. Bart.'s; A. F. D. Darlington, St. Thomas's; I. G. Davies and T. D. Deighton, St. Bart.'s; J. E. Elam, Cambridge and St. Bart.'s; J. A. Evans, Sheffield; S. Farquharson, St. Thomas's; W. H. George, London; H. M. Golding Bristol; T. S. Goodwin, P. D. Griffiths, and C. J. P. Grosvenor, Cambridge and St. Bart.'s; C. C. Halliwell, Cambridge and St. Thomas's; H. E. Harris and A. W. Hart-Perry, St. Bart.'s; G. T. Henderson, Cambridge and Guy's; K. W. Heritage, London; Florence R. Hodges, St. Mary's; J. Holmes and J. P. W. Jamie, St. Bart.'s; J. W. W. Jepps, St. George's; J. H. Kok, Middlesex; R. Lang, London; D. E. Lawrence, St. Bart.'s; R. S. McLatchy, London; C. I. N. Morgan, St. Bart.'s; E. G. Morris, St. Thomas's; O. G. Morris, Guy's; L. N. Moss, St. Mary's; F. W. G. Nash, Middlesex; M. Nazmi, Univ. Coll.; E. E. Neser, Guy's; C. P. O'Brien, St. Bart.'s; P. H. O'Donovan and R. J. Oliver, London; R. Owen-Jones, Middlesex; Amy M. Parkinson, Charing Cross; C. V. Powell, Bristol; R. J. V. Pulvertaft, Cambridge and St. Thomas's; V. J. Rao, London; R. L. Rhodes, St. Bart.'s; W. M. Roberts, Manchester; Nina L. D. Robertson, King's Coll.; M. Rochfelt, Univ. Coll.; E. J. H. Roth, St. Bart.'s; C. J. L. Sharp, London; H. M. Shelley, Sheffield; F. A. H. Simmonds, St. Bart.'s; Edith E. Stephens, Royal Free; J. D. M. Stewart, Cambridge and St. Bart.'s; Viva E. K. Stuart, St. Mary's; A. K. Tateson, Otago, St. Andrew's and Edinburgh; H. C. van Dort, Middlesex; D. Vaughan, Guy's; G. M. Wadsworth, Leeds; E. R. Weaver-Adams, St. Thomas's; H. B. White, St. Bart.'s; R. W. White, London; S. C. H. Worseldine, Guy's; and H. Yates, Cambridge and St. Thomas's.

Midwifery.—A. Ahmed, Birmingham; R. D. Alexander, St. Thomas's; F. G. A. Armson, Birmingham; N. F. Azer, Cairo and Charing Cross; Georgette Bachrach and Rose Baranov, Univ. Coll.; T. F. Barlow, London; O. Bastable, Leeds; E. R. Bennion, Westminster; E. M. Bergheim, Middlesex; E. J. Blackaby, St. Bart.'s; L. G. Blair and D. R. Blunn, London; W. R. Bowen, Middlesex; E. G. Bradbeer, Bristol; W. H. Bradfield, Guy's; E. T. Brice, Middlesex; W. Brockbank, Cambridge and Manchester; R. W. Brookfield, Liverpool; Doris D. Brown, St. Mary's; W. G. S. Brown, Cambridge and St. Bart.'s; E. Buchler and G. H. Buncombe, St. Bart.'s; I. Caley, King's Coll.; W. H. Cameron, Middlesex; L. W. Cann and R. J. Cann, Guy's; R. E. D. Cargill, St. Bart.'s; J. A. Carman, London; C. M. Carruthers, Queen's Univ.; J. H. H. Chataway, St. Bart.'s; Nora Cheney, King's Coll.; H. F. Chillingworth, St. Bart.'s; H. K. Christie, Otago; Gladys M. Clarke, St. Mary's; H. G. Close, Guy's; A. M. Cooke, St. Thomas's; Rosemary Cooke, Cambridge and Charing Cross; C. R. Cooke-Taylor, Univ. Coll.; A. N. Coomaraswamy, Madras and London; A. B. Cooper, St. Bart.'s; Margaret Corner, London; W. H. M. Cowper, Middlesex; D. A. L. Crawshaw, Guy's; B. W. Cross, St. Bart.'s; G. P. Crowden, Univ. Coll.; D. E. Cuffey, King's Coll.; E. R. Cullinan, St. Bart.'s; J. Cumming, Manchester; A. F. D. Darlington, Cambridge and St. Thomas's; Edith M. Davies, Cardiff; Gwladys D. Davies, King's Coll.; J. H. T. Davies and J. R. A. Davies, Cambridge and St. Bart.'s; P. O. Davies and T. Davies, St. Bart.'s; Dorothy L. C. Day, London; J. R. B. Dearden, Cambridge and St. Bart.'s; P. H. Diemer, St. Bart.'s; I. A. Dubinsky, Halle; W. H. du Plessis, St. Thomas's; Hilda R. Dutton, Bristol; A. C. M. Elman, Univ. Coll.; Mary H. Elmitt and Brenda H. English, Royal Free; H. G. Estcourt, Middlesex; D. M. B. Evans, Charing Cross; J. P. Evans, St. Mary's; T. J. Evans, Middlesex; R. B. Fawkes, Cambridge and Guy's; M. J. Finklestone, Sheffield; Theodora M. Fowler, J. H. Francis, and H. C. Gage, St. Mary's; J. F. Goodenough, Guy's; T. S. Goodwin, Cambridge and St. Bart.'s; W. Gough, Birmingham; F. M. Graham, King's Coll.; D. L. Greig, Middlesex; J. L. Griffin, Bristol; G. J. Griffiths, Middlesex; R. D. Gross, Guy's; J. E. S. Hamilton, Bristol; J. G. Hamilton, London; Greta Hartley, Royal Free; L. B. Haye, Univ. Coll.; H. N. Hearle, Guy's; Margaret R. Herford, Royal Free and St. Mary's; K. W. Heritage, London; A. G. Heron, Bristol; J. C. Hewetson, E. F. Hewlitt, and G. C. Hughes, Guy's; W. S. Hunt, Cambridge and Guy's; I. M. Hurwitz, Guy's; D. F. Hutchinson, St. Thomas's; Ethel J. Isaacs, Westminster; S. P. Jacobson, Guy's; Bessie G. Jemson, London; A. H. Johns, Cambridge and St. Bart.'s; D. Jones, London; D. S. M. Jones, Middlesex; E. Jones, Guy's; Enid M. Jones, Cardiff; H. M. R. Jones, Middlesex; Doris E. Joscelyne, Bristol; C. J. Jewett, Manchester; A. K. Kerr, St. Bart.'s; E. F. King, Bristol; M. C. H. Kingdon, St. Mary's; R. Lang, London; F. Langford, Bristol; J. C. C. Langford and J. H. R. Laptain, St. Bart.'s; W. C. Latham, Liverpool; Mary K. Lawlor, King's Coll.; J. J. Laws, Guy's; Dorothy N. L. Leverkus, Royal Free; J. J. Lewenstein, Guy's; Nancy R. Lewis, St. Mary's; L. A. N. Line, Birmingham; W. H. G. M. Ling, St. Mary's; W. J. E. Lupton, St. George's; Kathleen M. Lyons, Univ. Coll.; E. M. McCausland, Middlesex; A. F. McGlashan, St. George's; Lily C. MacKinnon, Charing Cross; R. B. McVicker, St. Thomas's; F. Marsh, Guy's; G. R. Marshallsay, St. Mary's; F. Martin, Guy's; Margaret D. Mason, London; Gwendolen S. Mence, St. Mary's; G. A. Metcalfe, Cambridge and St. Thomas's; M. Meyers, St. Bart.'s; K. F. T. Mills, Cambridge and Middlesex; S. M. Milner, Cambridge and Manchester; G. F. L. Mitcheson, St. Thomas's; W. E. Moody, St. Mary's; E. G. Morris, St. Thomas's; N. Moulson, St. Bart.'s; R. T. Mummery, St. Mary's; C. A. Nadkarianda, Bombay and London; Grace H. Newell, Royal Free; C. P. O'Brien, St. Bart.'s; J. E. Outhwaite, Leeds; D. U. Owen, Liverpool; L. E. Owen and R. D. Owen, Guy's; J. Parrish, St. Bart.'s; K. O. Parsons, Guy's; H. R. Paterson, St. Thomas's; J. F. Payan, Guy's; P. R. Peacock, Middlesex; D. B. Phillips, St. Thomas's; T. M. Preece, St. Bart.'s; T. W. Preston and Nora Proctor-Sims, King's Coll.; R. J. V. Pulvertaft, Cambridge and St. Thomas's; F. K. B. Quanbrough, Bombay and St. Bart.'s; E. H. Rampling, St. Thomas's; W. A. Rankin, Westminster; Thirza Redman, Liverpool; S. F. Reynolds, Charing Cross; Grace D. Rice, St. Mary's; W. A. Robb, St. Bart.'s; H. A. Robertson and Nina L. D. Robertson, King's Coll.; Sybil H. G. Robinson, London; W. C. Robinson, King's Coll.; G. F. Rowbotham, Manchester; E. A. Rucker, Middlesex; E. J. Ryan-MacMahon, St. Thomas's; M. B. Seng and E. C. Seward, Guy's; H. M. Shelley, Sheffield; A. E. Sherwell, Bristol; A. S. Simpson, King's Coll.; A. D. H. Simpson, St. Bart.'s; T. H. Sims, Cambridge and St. Thomas's; A. E. Slinger, King's Coll.; A. J. D. Smith and A. W. H. Smith, St. Bart.'s; R. H. Smith, Manchester; L. Spira, Vienna and Prague; W. R. Spurrell, Guy's; B. G. Staniland, London; R. S. Starkey, Cambridge and St. Thomas's; L. Statnigrosh, Middlesex; Edith E. Stephens, Royal Free; E. B. Strauss, King's Coll.; T. R. Sutherland, Cambridge and St. Bart.'s; Annie Sydenham, Royal Free; G. Taylor, St. Mary's; Portia K. Taylor, Univ. Coll.; C. Thomas, London; E. J. Thomas, Cardiff and St. Thomas's; Mary Thomas, Univ. Coll.; O. F. Thomas, Manchester; K. W. Thorp, Cambridge and St. Thomas's; D. S. Todd-White, Guy's; J. R. Tree, Middlesex; D. C. Vaughan, Manchester; H. F. Walker, Middlesex; J. L. le C. Walker, Guy's; Florence M. Wallen, Cardiff; S. E. Walmsley, St. Bart.'s; Y. S. Wan, Cambridge and St. Bart.'s; Dorothy A. Waterfield, London; H. J. W. J. Westlake, Guy's; J. M. F. Whitby, St. Thomas's; Fanny M. Whittaker, Charing Cross; Marian E. Williams, Royal Free; Dorothy Winstanley, Liverpool; A. W. Wood, Birmingham; Dorothy Wood, Charing Cross; Isabelle J. Woodhouse, Royal Free; H. Yates, Cambridge and St. Thomas's; Muriel M. Yates, St. Mary's; and Z. M. Yusuf, St. Bart.'s.

ROYAL COLLEGE OF PHYSICIANS OF EDINBURGH, ROYAL COLLEGE OF SURGEONS OF EDINBURGH, AND ROYAL FACULTY OF PHYSICIANS AND SURGEONS OF GLASGOW.—**The following candidates have passed the Triple Qualification Examination:—**

FINAL EXAMINATION.

Eileen M. M. Macdonald, Annie D. Allen, Morton Kahn, James L. Connacher, Claudius D. Wickramasinghe, Maurice N. Gelb, Edward T. Hale, Lawrence A. Moody, Donald G. Coutts, Howard M. Jamieson, Cyril A. Paulusz, Martha D. Devon, Duncan R. Nicol, Herman S. N. Menko, William E. Haydon, Frederick N. Spittel, Peter M'Donald Milliard, Ruby S. Beveridge, Eliazer Gelfer, and James Reid.

Medicine.—James S. Allan, Andrew Bury, Kathleen M. R. Dunn, Charles M. Hinds, James A. Kerr, Dunstair D. S. Outschoorn, William R. Robertson, Herbert E. Schokman, Arthur H. Stephenson, San Hock Tan, John G. Thomas, and Joseph R. Whitaker.

Surgery.—Elizabeth Clark, Herbert M. Hobson, James A. Kerr, Richard F. Kerr, Arthur W. H. Noble, James Ryan, and Joseph R. Whitaker.

Midwifery.—James S. Allan, Andrew Bury, Kathleen M. R. Dunn, Charles M. Hinds, Herbert M. Hobson, Percy A. M. Jayewardeni, Ronald M. Mackinnon, Patel Shankerlal Hathibhai Masters, Dunstair D. S. Outschoorn, Don Swithin M. E. Perera, William J. Rankine, William R. Robertson, Alexander Ross, James Ryan, Herbert E. Schokman, Hariprasanna Sen, Arthur H. Stephenson, San Hock Tan, and John G. Thomas.

Medical Jurisprudence.—Alexander S. Ballantine, Sudhindra Nath Bandyapadhay, Vernon Bell, John S. Caldwell, Charles Campbell, Isaac Chesarki, Mollie F. Churcher, Frederick W. Duthie, Abraham M. Filer, Alexander J. M. Findlater, Rodney H. Holb, Joseph Horsham, Constance P. H. Hunter, John A. A. Hunter, Edward N. Jamieson, William A. Kemp, Douglas J. Kynock, Jemima M. M'Kendrick, Cecil J. R. Morrison, Constance C. Reid, William M. B. Rossie, William A. Rogers, Joseph F. Sweeney, San Hock Tan, Matthew M. Tannahill, Joseph R. Whitaker, Albert E. Williamson, and Archibald C. Young.

INTERNATIONAL UNION AGAINST TUBERCULOSIS.—**The Council of Directors held its annual meeting in Paris on July 26th at the headquarters of the League of Red Cross Societies, when 20 members of the Council from different countries met under the presidency of Dr. Dewez, of Brussels. Prof. Léon Bernard, secretary-general, gave an account of the development of the Union since the Brussels conference. It was decided that the following questions should be placed on the agenda of the conference to be held at Lausanne in September, 1924:—**

1. Relations between pregnancy and tuberculosis, to be reported on by Prof. Forssner (Stockholm).

2. Do there exist naturally or can there be produced artificially saprophytic forms of Koch's bacillus which might become virulent tubercle bacilli? Report by Prof. Calmette (Paris).

3. Effects of the organisation of the anti-tuberculosis campaign in different countries on the decrease in tuberculosis mortality. Report by Sir Robert Philip (Edinburgh).

The report of Prof. Besançon (Paris) on the question of the "Respective Value of Techniques for Research on Koch's Bacillus in the Diagnosis of Lesions in Human Tuberculosis" gave rise to an interesting discussion. This report will appear in the next number of the *Bulletin*.

NATIONAL MILK CONFERENCE.—The National Clean Milk Society has convened a conference on the subject of pasteurisation, to be held on Wednesday, Nov. 21st, 1923, in the Council Chamber of the Guildhall, London, E.C. Papers will be read on: (1) Methods and Processes of Pasteurisation; (2) Physical Changes (Cream Line, &c.); (3) Chemical Changes (Salts, &c.); (4) Bacteriological Changes; (5) Biochemical Changes; and (6) Financial and Commercial Aspect. A detailed programme will be issued later.

SALFORD MILK-SUPPLY.—That some real standard of cleanliness of milk is required is made evident by Mr. C. D. Elsdon, the Salford public analyst, in his annual report on the result of previous observations and of 497 samples of milk examined for sediment during the year. What is called a very lenient standard was fixed—viz., that those samples which give a sediment of more than 5 volumes per 100,000 were characterised as adulterated. Since 1915 2528 samples of milk were examined, and of these 864 were entirely free from sediment and 1136 contained between 0 and 1 part of sediment per 100,000 parts of milk; thus 79 per cent. of the samples examined for dirt over a period of six years contained not more than 1 part of sediment per 100,000 parts of milk. Mr. Elsdon remarks that it would appear, therefore, that a standard of not more than 1 part of sediment per 100,000 parts of milk would be perfectly fair and that milk containing 2 or more parts per 100,000 should be classified as unsatisfactory. Moreover, "the subject is one of peculiar difficulty, as it is quite easy for the retailer to remove the bulk of the visible dirt by filtration or decantation immediately before selling the milk. The purchaser may think, therefore, that he is getting a clean, pure article, whereas a serious bacterial contamination, which is the usual concomitant of visible dirt, entirely escapes notice. During the year standards for various milks of special grades have been issued officially, but it seems most desirable that the ordinary milk sold to the public, which, after all, will always constitute the bulk of the milk sold in this country, should be required to come up to some standard of cleanliness both physical and bacteriological, even if this standard is, of necessity, lower than those for the special milks mentioned." Mr. Elsdon also states that of the samples of milk—923 in number—49, or 5·3 per cent., were adulterated.

MILK (SPECIAL DESIGNATIONS) AMENDMENT ORDER (SCOTLAND), 1923.—The Scottish Board of Health has issued for the information of local authorities copies of an Order which gives effect to certain amendments on the principal Order, dated June 15th, 1923. These amendments are as follows:—

(1) *Pasteurised Milk.*—The figures of the bacterial count applicable to samples of pasteurised milk have been increased to (1) before Jan. 1st, 1924, not more than 200,000 bacteria per c.cm.; and (2) after Jan. 1st, 1924, not more than 100,000 bacteria per c.cm. The Board are advised that if pasteurised milk is handled with proper precautions, the amended figures of the bacterial count should enable distributors to sell such milk unbottled.

(2) *Grade A Milk (Pasteurised).*—The bacterial count now applicable to Grade A Milk (Pasteurised) is (1) before Jan. 1st, 1924, not more than 50,000 bacteria per c.cm. and no coliform bacillus in one-hundredth of a c.cm.; and (2) after Jan. 1st, 1924, not more than 30,000 bacteria per c.cm. and no coliform bacillus in one-tenth of a c.cm.

Further copies of the Order may be obtained through any bookseller, or direct from H.M. Stationery Office.

MIDDLESEX HOSPITAL MEDICAL SCHOOL.—The winter session, 1923-24, will open on Oct. 2nd at 3 P.M., when the introductory address will be delivered at the Scala Theatre by Mr. Somerville Hastings, on Team Work in Nature, after which the prizes gained during the previous year will be distributed by H.R.H. Princess Alice, Countess of Athlone. The annual dinner will be held the same evening at 7.30 at the Trocadero Restaurant, Sir John Bland-Sutton in the chair. Those wishing to be present at the dinner should communicate as soon as possible with the secretary-superintendent of the hospital.

LONDON INTER-COLLEGIATE SCHOLARSHIPS BOARD. The following awards of medical scholarships and exhibitions have been made on the results of the Board's examination held in June:—University College: Bucknill Scholarship: J. R. Pierre, Royal College, Mauritius. Medical Exhibitions: A. S. Hatch, Bishop's Stortford College; M. Levy, Central Foundation School. Westminster Hospital Medical School: Natural Science Scholarship: H. J. Shorvon, East London College. London (R.F.H.) School of Medicine for Women: Mabel Sharman Crawford Scholarship: Marguerite M. Fenn, Trinity Hall, Southport. St. Dunstan's Medical Exhibition: Joyce R. Woods, City of London Girls' School. Isabel Thorne Scholarship: Decima M. Tracey, Hamilton House School, Tunbridge Wells. Mrs. George M. Smith Scholarship: Kathleen E. Gambrell, County Secondary School, Streatham.

WELLCOME HISTORICAL MEDICAL MUSEUM.—The museum will be closed for cleaning from Sept. 1st to 30th inclusive.

SMALL-POX IN ENGLAND AND WALES.—The number of cases reported during the week ending August 4th was only 21. Of these, 15 were from Gloucestershire, 3 from Derbyshire, 2 from the West Riding of Yorkshire, and 1 from Notts.

CODE WORDS FOR MEDICAL TELEGRAMS.—In May last the faulty transmission of a code word by telegram led to tragic delay in administering diphtheria antitoxin to a 3-year old child. The Postmaster-General has announced the disuse for such urgent telegrams of the code words for "positive" or "negative," substituting the words "present" or "not found," in regard to which no confusion would be possible.

CANCER RESEARCH IN MANCHESTER.—By means of the munificent bequest of £5000 under the will of the late Mr. Hugh Fullerton for cancer research, and a recent gift of £1000 for similar purposes by Mr. and Mrs. Todman, of Sydney, the committee of the Manchester Christie Hospital finds itself in a position to supplement the research work conducted for many years by Dr. C. Powell White. Among other suggestions, the committee has had under consideration the offer of a "Fellowship" and hopes to be in a position to announce its decision during the autumn.

DEATH OF DR. J. FERGUSON.—John Ferguson, M.B., B.S. Lond., who died suddenly in London on August 13th, was a student at St. Bartholomew's Hospital and qualified in 1904, taking his London medical degrees three years later. He was in general practice at Cheam and surgeon to the Epsom and Ewell Cottage Hospital before coming to London to take up consulting work. He was a member of the Special Neurological Board of the Pensions Ministry at Cheltenham-terrace, Chelsea, and honorary physician to the Governesses' Benevolent Institution.

INDUSTRIAL WELFARE SOCIETY.—The society will hold its fourth annual lecture conference at Balliol College, Oxford, on Sept. 14th–19th. The conference will be open to men and women welfare supervisors; employers, heads of management, labour leaders, and others are attending these conferences in increasing numbers. The provisional programme includes the following items:—Friday, 14th: 7 P.M., dinner; 8 P.M., opening address by Mr. W. L. Hichens (chairman, Cammell Laird and Co., Ltd.). Saturday, 15th: Morning, paper: Modern Factory Administration, by Mr. A. D. Denning. Afternoon, practical demonstration in industrial psychology, by Miss May Smith (Industrial Fatigue Research Board). Sunday, 16th: Morning, paper: The Romance of the Factory Acts, by Miss Constance Smith (H.M. Deputy Chief Inspector of Factories). Monday, 17th: Morning, paper: Thrift Schemes in Industry, by Sir William Schooling (vice-chairman, National Savings Committee). Afternoon, paper: Welfare Possibilities, by Mr. Eldred Hallas (National Union of General Workers). Evening, papers: The Organisation of Leisure, by three supervisors. Tuesday, 18th: Morning, special session for welfare supervisors. Afternoon, paper: Training the Young Worker, by Mr. H. Schofield (Principal, Loughborough College). The inclusive fee for membership of the conference is 75s., payable in advance to the Industrial Welfare Society, 51, Palace-street, Westminster, S.W. 1.

Medical Diary.

Information to be included in this column should reach us in proper form on Tuesday, and cannot appear if it reaches us later than the first post on Wednesday morning.

LECTURES, ADDRESSES, DEMONSTRATIONS, &c.

WEST LONDON POST-GRADUATE COLLEGE, West London Hospital, Hammersmith-road, W.

MONDAY, August 20th.—10 A.M., Mr. Maingot: Surgical Pathology. 12 noon, Mr. Simmonds: Applied Anatomy. 2 P.M., Mr. Addison: Surgical Wards.

TUESDAY.—10.30 A.M., Dr. Paterson: Medical Wards. 12 noon, Dr. Burrell: Chest Cases. 2 P.M., Mr. Banks-Davis: Throat, Nose, and Ear Dept.

WEDNESDAY.—10 A.M., Mr. Banks-Davis: Operations on Throat, Nose, and Ear. 2 P.M., Mr. Gibb: Eye Dept. 3 P.M., Dr. Pernet: Skin Dept.

THURSDAY.—10 A.M., Dr. Grainger Stewart: Neurological Dept. 12 noon, Mr. Simmonds: Demonstration of Fractures. 3 P.M., Dr. Scott Pinchin: Medical Out-patients.

FRIDAY.—10 A.M., Mr. Dudley Buxton: Dental Dept. 2 P.M., Dr. Burrell: Medical Out-patients. 2 P.M., Mr. Sinclair: Surgical Out-patients.

SATURDAY.—10 A.M., Medical Registrar: Diseases of Children.

Daily, 10 A.M. to 6 P.M. Saturdays, 10 A.M. to 1 P.M. In-patients, Out-patients, Operations, Special Depts.

Appointments.

DICKSON, C., M.D. Belf., D.P.H., has been appointed Chief Medical Officer of the Irish Free State Post Office.

EDWARDS, T. P., M.D., B.S. Lond., D.P.H. Camb., Medical Officer of Health to Wrexham Urban and Rural District Councils.

GALLOWAY, D. J., M.D. Edin., to be a Member of the Executive Council of the Straits Settlements.

NEIL, W. F., F.R.C.S. Eng., one of the Medical Referees under the Workmen's Compensation Act, for County Court Circuit No. 18.

SOUTHAM, A. H., M.D., M.Ch. Oxf., F.R.C.S. Eng., one of the Honorary Surgeons to the Manchester Victoria Memorial Jewish Hospital.

Vacancies.

For further information refer to the advertisement columns.

Belgrave Hospital for Children, 1, Clapham-road, S.W.—H.P. and H.S. Each £100.

Birmingham, Children's Hospital.—H.P. and H.S. Each £100. Also R.M.O. £150.

Birmingham, Queen's Hospital.—Third P. for Out-patients. £50.

Blackburn County Borough.—Female Asst. M.O.H. £736.

Bristol Royal Infirmary.—Sen. Res. M.O. £300. Also H.P.'s, H.S.'s, each £120, and Dent. H.S., £156.

Burnley, Victoria Hospital.—H.S. £200.

Cape Town, Somerset Hospital.—Res. Med. Supt. £750.

Carlisle, Cumberland Infirmary.—Res. M.O. £175.

Chester Royal Infirmary.—Hon. Asst. Anæsthetist.

City of London Hospital for Diseases of Heart and Lungs, Victoria-park, E.—Half-time M.O. £200.

Colombo Municipality, Ceylon.—Third Asst. M.O.H. Rs. 9000.

Dumfries, Crichton Royal Mental Hospital.—Asst. P. £350.

East African Medical Service.—M.O. £600.

Hull Tuberculosis Sanatorium, Cottingham.—Res. Tub. O. £350.

Ipswich County Borough.—Asst. M.O.H., &c. £500.

Kent County Council.—Tuberculosis O. £696 4*s.* 8*d.*

Leamington Spa, Warneford, Leamington, &c., General Hospital.—Res. H.P. £150.

Leicester Royal Infirmary.—Locum Tenens Anæsthetist.

London Temperance Hospital, Hampstead-road, N.W.—H.P. £120.

Manchester, St. Mary's Hospitals for Women and Children.—Two H.S.'s. Each £50.

Manor House Hospital, Golders Green, N.W.—Jun. H.S. £150.

Miller General Hospital for South-East London, Greenwich-road, S.E.—Res. Cas. O. £200.

Reading, Royal Berkshire Hospital.—Hon. Asst. P. Hon. Asst. Anæsthetist. Also H.S. £150.

Royal Naval Medical Service.—Surgeon-Lieutenants.

St. Bartholomew's Medical College, E.C.—Demonstrator of Physiology.

Southampton, Royal South Hants and Southampton Hospital.—Jun. H.S. £150.

South London Hospital for Women, South Side, Clapham Common, S.W.—First H.S. £100. Second H.S. £50. Also H.P. £100.

Staffordshire Education Committee.—Two Asst. School Med. Inspectors. £600.

Warrington Infirmary and Dispensary.—Jun. H.S. £200.

Warrington, Lancashire County Mental Hospital, Winwick.—Deputy Med. Supt. £350.

Warwickshire, King Edward VII. Memorial Sanatorium, Hertford Hill, near Warwick.—Asst. Res. M.O. £350.

West African Medical Service.—M.O. £660.

West London Hospital, Hammersmith-road, W.—H.P.; also two H.S.'s. £100.

West Riding County Council.—School Med. Inspector. £500.

York City Mental Hospital, Fulford.—Locum Tenens. £7 7*s.* weekly.

The Chief Inspector of Factories, Home Office, London, S.W., announces a vacant appointment at Lydney (Gloucester).

Births, Marriages, and Deaths.

BIRTHS.

HAWARD.—On August 11th, at The Wold, Woldingham, Surrey, the wife of Walter Haward, M.B., B.S., of a daughter.

SAUNDERS.—On August 10th, at Lyford-road, Wandsworth Common, the wife of Dr. R. J. Saunders of a daughter.

MARRIAGES.

BOOBBYER—SHAW.—On August 7th, at Christ Church, Oxford, Philip Watson Boobbyer, B.A., M.B., B.Ch. Oxon., M.R.C.S., L.R.C.P., to Vera Elisabeth Shaw, M.R.C.S., L.R.C.P., second daughter of Bishop and Mrs. Shaw, of Christ Church, Oxford.

DEATHS.

ACKLAND.—On August 6th, at St. James'-court, S.W., Robert Craig Ackland, C.B.E., M.R.C.S., L.R.C.P., L.D.S., aged 58.

STENHOUSE.—On August 10th, at St. Andrews-place, Lewes, John Robert Stenhouse, M.D. Lond., aged 52 years.

*N.B.—A fee of 7*s.* 6*d.* is charged for the insertion of Notices of Births, Marriages, and Deaths.*

Notes, Comments, and Abstracts.

THE HYGIENE OF SWIMMING.

Some Feats of Endurance.

PROMINENCE has been given to swimming as a pastime by the remarkable spell of hot weather in this country and by the fact that the English Channel has been crossed in the course of a single week by swimmers starting from either bank. The exploit of an Argentinian has easily broken all previous Channel records. The successful swims are now :—

Date of exploit.	Name of swimmer.	Age.		Distance traversed in miles.	Time.
1875 Aug. 24–25	Matthew Webb	27	Dover–Calais	45	21 h. 45 m.
1911 Sept. 5–6	Thos. Wm. Burgess	40	Dover–Calais	63	22 h. 35 m.
1923 Aug. 5–6	Henry Sullivan	34	Dover–Calais	56	26 h. 50 m.
1923 Aug. 11–12	S. Enrico Tiraboschi	35	Calais–Douvres	—	16 h. 23 m.

Captain Webb, the first champion, was 5 ft. 8 in. in height, weighed 14½ st., and had a chest measurement of 41½ in. He was freely anointed with porpoise grease before the swim but expressed a doubt whether this benefited him in any way. Much exhausted when he left the water, he yet felt as warm as when he started. He slept several times as he was being driven to his hotel, where his body temperature on arrival was found to be 98° F. On waking five hours later it was 101° F., his face was flushed, and his skin hot and dry. After further sleep he awoke apparently none the worse for his exertions except for stiffness of arms and legs and some trifling abrasions on the neck caused by the salt water. A sphygmographic pulse-tracing, however, which appeared in THE LANCET of Oct. 16th, 1875 (p. 576) excited some comment on the sudden fall of the downstroke and the marked dicrotism. Mr. Burgess's achievement was the more remarkable in that he was almost 6 ft. in height and 13 years Capt. Webb's senior. He was rubbed all over with lard before entering the water. The only food which he partook during his swim consisted of Swiss milk chocolate, a few grapes, and the leg of a chicken. He was just able to walk ashore after his swim. Mr. Sullivan, who is a native of Lowell, Massachusetts, had made repeated attempts to swim the Channel from the age of 20 years. He only took nourishment once during his swim, and walked out of the water and re-embarked for Dover after two hours' rest. Sign. Tiraboschi swam fast and well throughout, drank some coffee at the critical stage of his journey, and did not seem in any distress on landing, when he was rubbed down, and within a quarter of an hour walked to the rowing boat which took him back aboard the French tug.

The Dangers of Swimming Pools.

Swimming has always taken a high place among healthy exercises. It is more and more pushed by organisers of physical training, and year by year the proportion of swimmers increases among the school-children in our inland industrial towns. It is therefore extremely important that the condition of the water in swimming baths and pools should be as pure as is reasonably possible. This point is raised by Public Health Bulletin No. 133, on the transactions of the third annual conference of State Sanitary Engineers, just issued by the Treasury Department of the U.S.A. A committee in 1921 issued questionnaires to all ear, eye, nose and throat specialists in the United States, and to a large proportion of the dermatologists asking for their experience of diseases thought to have been acquired either from the water, bathing suits, or towels used at swimming baths or pools. Seven hundred replies were received. Epidemics of mild and acute conjunctivitis were reported by 19 physicians from 12 cities in 8 States. Epidemics of furunculosis of the external ear, otitis media, and other ear infections were reported by 10 physicians from 11 cities in 9 States. Epidemics of colds, rhinitis, and sinus infections were reported by 4 physicians in 4 cities, and a similar number of epidemics of tonsillitis, pharyngitis, or laryngitis. Eight epidemics of skin infection were reported, of which two of impetigo and one of boils were attributed to infected water, while two of molluscum contagiosum, one of tinea cruris, and one of streptococcal infection were attributed to infected bathing suits and towels. One epidemic of typhoid fever was traced to a swimming pool at Louisville, Ky.; an epidemic of typhoid in a school camp was traced to bathing in a polluted stream, and another intestinal epidemic to a similar cause—a truly formidable list, even if the evidence in every case would not have convinced a court of justice. One case is mentioned where an investigation made in response to many complaints failed to find evidence of disease acquired from

bathing, but did find that the water was at times highly polluted. It appears from the report that regulations for the control of swimming pools and baths have been adopted in seven States. Liquid chlorine was used as a disinfectant in 27 out of 44 pools with regard to which information was supplied, but at 17 of these pools the bathers complained of the smell or taste or irritating effect of the treated water on the skin or eyes.

Hygienic Precautions.

Some aural surgeons regard public baths as a prolific source of infected ears, witness the correspondence in our own columns following on the announcement in 1921 of an epidemic of swimming-bath conjunctivitis and Eustachian catarrh at Freiburg i. B.[1] The tendency may be to blame the swimming bath overmuch, just as in the early days of sanitation a large proportion of illness was quite unwarrantably put down to defective drains. Then most drains were defective and now a large proportion of the population use swimming pools. Much attention is being given to improving the water of these pools; following the example of Poplar, chlorination and continuous filtration have been successfully adopted at many of them. The deputy city engineer of Hull, Mr. T. Thomas, told the recent Sanitary Institute Congress that Hull has now three continuous filtration plants, and he referred to the Bermondsey plant which had been working satisfactorily at the Rotherhithe baths since 1906. Swimming should be encouraged, and attention concentrated on improving the conditions which in many cases do not come effectively under the purview of the medical officer of health. This is a matter which the Ministry of Health might usefully take up. School medical officers have the opportunity of noticing any deleterious effects of the ever-increasing use of public baths by school-children. Visitors to the Sanitary Congress at Scarborough this year saw the splendid open-air swimming pool constructed by the corporation; a similar pool is nearing completion at Cleethorpes. Every seaside resort worthy of the name should have an open-air swimming pool containing water above suspicion.

PUBLIC HEALTH IN CAIRO.[2]

THE population of the city of Cairo at the middle of 1920 was estimated at 761,300, of whom 72,770 were "foreigners," that is (presumably), non-Egyptians (including H.E. the High Commissioner and the author of this report). It is stated, however, that this estimate (which is a reduction of 387 below the 1917 census) must be considerably below the actual number of inhabitants, as the city has never been more crowded than in the year under review. Also, the village of Kafr-el-Gamûs, with a population of 1200, has been added to the Cairo circumscription during the year; and what is termed "Greater Helwân," embracing a considerable area "attached to the city for all public health purposes, except the registration of births and deaths," with an estimated population of 24,641, brings up the total of Cairo inhabitants to 785,941, upon which figure the zymotic diagrams are based. The birth-rate was 47·3 per 1000, as against 42·0 in 1919 and the same for the quinquennium; as usual, there were great variations in different parts of the city: in Bulâq the ratio was 59·5, in Esbekiya (the European quarter) only 33·1. The death-rate (after deducting 1082 deaths of non-residents) was 36·3 per 1000, as compared with 41·4 in 1919, 49·4 in 1918, and 40·5, the quinquennial mean. The highest district rates were registered in Bulâq (44·6), Old Cairo (44·0), and Khalifa (42·3); while in Helwân and Esbekiya the ratios were only 27·0 and 27·7 respectively. The total number of infantile deaths (after deducting 178 in various institutions, of children from outside Cairo) was 9164, being in a ratio of 255 per 1000 births, as compared with 238 in 1919, and 329 in 1918. In Musky and Helwân districts the ratios were 204 and 212 respectively; in Bulâq and Old Cairo they were 288 and 301. The main cause of death was diarrhœa, which was very prevalent in the hot weather, the mortality being over 30 per cent. of births from the middle of May to the middle of August.

Infectious Diseases.

For infectious diseases as a whole there was a very notable improvement over the experience of the two preceding years; the notifications of the eight principal diseases being only 6·155 per 1000, as compared with 11·659 in 1919, and 10·535 in 1918; the corresponding death-ratios were 1·899, 5·051, and 4·328 per 1000. For small-pox there were only 157 cases recorded (0·199 per 1000), with 50 deaths (0·063 per 1000); but the fatality was high (31·8 per cent.), suggesting that many cases were not reported; indeed, 41 out of these 50 deaths were only diagnosed post mortem, as there had been no medical attendance. In 1919 there had been 1455 cases (1·851 per 1000) and 494 deaths (0·628). It is noteworthy that in the Musky district, where the small-pox death-rate (1·382 per 1000) had been much higher than in any other district of the city in 1919, only eight cases occurred, and not a single death, during the year under report. Possibly vaccination had been resorted to. There was a considerable increase in measles, both in cases (1·685 per 1000) and in deaths (0·514), as compared with the 1919 ratios (0·914 and 0·402); in Saiyeda Zenab the death-rate was 1·1, and in Darb-el-Ahmar 1·749 per 1000. Scarlet fever caused only four deaths in 39 cases. Diphtheria showed a considerable decrease, 0·418 cases and 0·097 deaths per 1000; 37 out of the total 329 cases, and 26 out of the total 77 deaths occurred in Darb-el-Ahmar ward (Rue de la Citadelle); while in Bab-el-Shariya and Helwân there was not a single death. Typhoid fever also was much less prevalent; the total cases numbered 925, less than in any year since 1913, the morbidity being 1·176 and the death-ratio 0·273 per 1000; the case incidence varied from 0·478 in Gamaliya ward to 1·941 in Esbekiya and 2·084 in Wayli; but the highest death-rates were registered in Khalifa ward (0·460) and Old Cairo (0·553). There has been a considerable reduction during recent years in the case-mortality, or fatality ratio, which was 43·2 per cent. in 1916, 24·9 in 1919, and 23·2 in 1920; this may probably be due to more effective notification of cases, which, of course, is most important. Typhus fever was prevalent, but less so than in the two preceding years. The cases and deaths numbered 1606 and 705, giving ratios of 2·043 and 0·897 per 1000; in 1919 the relative ratios were 6·139 and 3·344; the case-mortality was also lower, 43·9 compared with 54·5 per cent. Wayli and Saiyeda Zenab had the largest numbers of cases (198 and 182), but the Musky and Abdin had the highest relative case-incidence (3·138 and 2·663 per 1000), while Darb-el-Ahmar and Old Cairo had the highest death-rates (1·545 and 1·446), the highest fatality ratios occurring in Old Cairo (66·2 per cent.) and Gamaliya (65·8). It may be supposed that the mortality ratios in these diseases are more to be relied on than those of case-incidence. Relapsing fever caused 23 deaths (0·29 per 1000), nine of which occurred in Darb-el-Ahmar; and from cerebro-spinal fever there were 15 deaths (0·019 per 1000), nine of which also occurred in the same ward. There were 1587 cases of influenza with 130 deaths (0·165 per 1000); all the deaths, except eight, occurred between the middle of January and the middle of April; there were also 1518 deaths from pneumonia and broncho-pneumonia, many of these being, no doubt, due to influenza infection. Six cases of encephalitis lethargica were notified, of which five proved fatal. At Qantara three cases of malignant pustule on the cheek occurred among the troops in August, each patient having recently bought a shaving-brush, traced to the same consignment, which had been imported from Japan in June; on examination the medical officer found one of the brushes to be swarming with anthrax bacilli; this was fully confirmed on further examination of the stock of brushes, the unsold portion of which was bought up and destroyed, though, unfortunately, they had been widely distributed in the meanwhile. Subsequent consignments were examined before being released from the Customs, several of which were found to be infected. A law was promulgated forbidding the importation of shaving-brushes, unless accompanied by a certificate from a competent authority of the country of manufacture that efficient disinfection had been carried out, and authorising the destruction of infected consignments, as well as prohibition of importation, if considered necessary.

During the year 1920, 25,169 rooms and 241,760 articles of clothing were disinfected by the Abbasiya and Fum-el-Khalig services, formalin, sublimate solution, and cyllin being used for the premises, and steam for the clothing. A "delousing campaign" was also instituted against typhus and relapsing fever, the number of contacts deloused being 1979. At the Government Fever Hospital, Abbasiya, there were 3152 admissions, as compared with 5530 in 1919; the chief diseases treated were typhus (918 admissions), relapsing fever (568), influenza (546), typhoid (172) and small-pox (109); the case-mortality ratios were 27·7, 1·2, 1·2, 32·5, and 32·1 per cent. respectively. The number of uncertified deaths which required investigation because there had been no medical attendance during the last illness was 18,814—that is, 68·1 per cent. of the total deaths that occurred in the city; this ratio is lower than in any recent year (since 1913), but still very high; in Bulâq, Old Cairo, and Khalifa districts the ratios were 83·4, 84·4, and 85·6 per cent.; in Esbekiya only 23·3 per cent.

Preventive Measures.

The condition as regards infant vaccination does not appear to be quite satisfactory; there were 30,215 primary vaccinations of native children, which works out at 85·8 per cent. of the births, a fairly high and satisfactory ratio; but of the 656 children of foreign birth only 408 were vaccinated—that is, 62·2 per cent.; the nationality of these children is not stated. An important part of the public health organisation is that of the Passenger and Pilgrim Control Service; as many as 7951 persons arrived in Cairo

[1] THE LANCET, 1921, ii., 519 et seq.
[2] Government Press, Cairo. 1921.

from countries under supervision on account of being infected, a considerable increase on the arrivals (4288) in the previous year. The largest numbers (2958 and 2301) came from Syria and Turkey; 58 per cent. landed at Alexandria and 32 per cent. at Port Said, the remainder at Suez. In addition 19,646 Egyptian Labour Corps men from the Canal Zone required to be observed on entering Cairo. The supervision of "unhealthy, inconvenient, and dangerous establishments" (such as bakeries, groceries, dyeworks, stables, &c.) is another important, and difficult, duty; the conditions were found to be faulty in only 6·60 per cent. of the 14,667 inspection visits, an increase, however, on the ratio (5·5) in 1919; bakeries (26·8 per cent.) and confectionery establishments (22·0 per cent.) were the worst; but among the grocers (4613) and butchers (3558), which between them compose more than half the total, faulty conditions were found in only 4·0 and 1·1 per cent. respectively; even in dairies and milkshops not more than 14·6 per cent. were found to be unsatisfactory. At all police stations and outposts suitable arrangements have now been made for the reception and examination of injured persons, and police officers have been instructed in the elements of first-aid; a specially arranged medical chest has also been supplied for each fire-brigade motor. All men joining the police force are now vaccinated, and an anti-lice campaign has been instituted as a protection against typhus and relapsing fever. The amount of medical work carried out by the police medical officers appears to have been very considerable; as many as 8036 examinations of persons were made for injury or supposed injury (compared with 6029 in the previous year); 2088 cab-drivers and carters were examined for the Traffic Office, and 3219 *ghafirs* on account of sickness. Anti-mosquito work was carried out in certain selected areas where the inhabitants allowed access to their premises for dealing with possible breeding places; the Gezira area has benefited materially by the drainage work carried out in 1919–20. At Helwân *Culex* is found in the town almost exclusively and *Anopheles* in the outskirts.

At the conclusion of this most interesting report, Dr. P. G. S. Williams, medical officer of health for the city, mentions a measure likely to prove of great value to the public health that is being carried out in the smaller streets of the native quarters; this consists in laying down a paving of cubical stone setts, placed upon a clean sand foundation, and giving an impermeable surface, which can be kept clean. An improvement in the health of the inhabitants may be hoped for in the quarters so dealt with, and especially in the incidence of infantile diarrhœa. The report is well illustrated with diagrams and tables, and extremely well printed; the addition of a plan of the city, showing its present divisions, might be suggested.

THE EFFECT OF BACTERIAL EXTRACTS ON BLOOD-SUGAR.

IT is well known that substances such as peptone and certain proteins contained in yeast will lower blood-sugar when injected subcutaneously. Hopes were raised early in the year that "yeast insulin" might prove an effective remedy and that quantities of it would be available for clinical trial in the near future. In the current issue of *Nature* Messrs. L. B. Winter and W. Smith report briefly on their further work at the Biochemical Laboratory in Cambridge. They have now obtained from the action of micro-organisms, other than yeast, extracts which lower the level of blood-sugar in normal animals to a point where convulsions occur. These convulsions were relieved by injection of glucose, so that it is presumed they were not due to toxic substances in the injections. Such extracts seem to lower the level of blood-sugar for a longer time than does insulin itself, and it remains to be seen whether they can be utilised in the treatment of diabetes. Experiments to this end are being continued and will be followed with interest.

TO PARENTS OF DEFECTIVE CHILDREN.

A LITTLE book entitled "Opening Doors" (London and Edinburgh: Oliver and Boyd. 1923. Pp. 20. Cloth 1*s.* 6*d.*, paper 6*d.*) has been written by Dr. John Thomson for the mothers of mentally defective infants "in the hope that it may provide them with some of the instruction and encouragement of which they are often much in need." In the early months of a baby's life it is the mother who almost invariably has the best and sometimes the only opportunity of discovering whether her baby's development differs from that of a normal infant; and where this is the case there are many ways in which she can help him, many doors which she can at least place ajar for him, if any abnormality present be recognised sufficiently early. At present, as Dr. Thomson points out, a large proportion of mentally defective children begin to be educated for the first time when they are between 5 and 7, having had practically no training during the earlier and more receptive years of life; and the circulation of information of the kind contained in this book cannot but make the subsequent training of such children easier. The advice given is simple but eminently practical, and is so worded as not to offend the most susceptible of mothers. She is shown what she can do for her baby if he is forming bad habits; if he is doing or noticing too little; if he is late in speaking, cries constantly, or has fits; and how she can strengthen his character and keep him strong and well. Suggestions are given for the special treatment of children whose limbs are stiff, these including active and passive movements, as well as a number of miscellaneous common-sense hints. The value of this small book is out of all proportion to its size, and it should meet with a warm welcome not only from mothers, but also from child welfare workers, nurses, and even doctors.

A TUBERCULOSIS DIRECTORY.

A FOURTH edition has just appeared of the useful Handbook of Tuberculosis Schemes, issued by the National Association for the Prevention of Tuberculosis (20, Hanover-square, London, W. 1. 10*s.* 6*d.*, post free). Its aim is to give ready and trustworthy information regarding the operation of tuberculosis schemes and other tuberculosis activities throughout Great Britain and Ireland, to produce, in fact, a tuberculosis directory as far as mortality and provision for control and treatment are concerned. Any complete tuberculosis scheme, as the foreword indicates, includes the operations of a care-committee, and it is satisfactory to note that in a number of instances local authorities have frankly coöperated with voluntary agencies and have included in their schemes institutions established and maintained on voluntary lines. The Handbook now contains a number of tables and graphs effectively showing the varying death-rates in counties and boroughs for the year 1922. It will be found helpful by all who are interested in the development and administration of sound anti-tuberculosis measures.

THE SAN FRANCISCO MEDICAL MEETING.

THE recent annual meeting of the American Medical Association at San Francisco was attended by over 3750 medical men, this number exceeding that of 1915—when the Association last met in that city—by nearly 1500. The extensive publicity given by the press to the proceedings of the session is believed by Californian physicians to have been of great service in combating the advertising of non-medical cults which are particularly powerful in that State. The sessions of the House of Delegates, the governing body of the Association, were fully and closely attended, and many problems of professional and public importance were discussed. An innovation was introduced in the shape of clinics held in connexion with the meeting, both before and after it, throughout the Pacific Coast and Western States, in order to bring home the scientific work of the Association to those who were unable to be present at the actual gathering in San Francisco. At the first meeting of the House of Delegates on June 25th the Speaker, Dr. Frederick C. Warnshuis, of Grand Rapids, Mich., claimed that certain members and parts of the Association had during the past year used the promulgation of public health measures as an excuse to justify "the institution of socialised medicine for all classes of society," and that on that account "condemnation and ridicule are directed to the profession as a whole." If unity of purpose was to be nullified by the acts and attitude of certain special groups of members, the Association might as well withdraw from the public arena and concern itself only with purely scientific topics. Others of Dr. Warnshuis's recommendations referred to increased representation of the Association in the group of medical authorities who have been discussing, and are again expected to discuss, the organisation of a national welfare department in Washington, and to the cessation of any necessity for the Red Cross organisation to enter into public health or community clinic work. Dr. George E. de Schweinitz, of Philadelphia, President of the Association, spoke in his address of the ever-present question of the time which should be devoted to specialties in the undergraduate curriculum, and suggested that from the central offices of the Association a questionnaire of wide scope should be sent to graduates of representative schools of medicine in various parts of the country prior to the next meeting on medical education, and that an analysis of the replies received should be presented as a basis of discussion. Dr. Ray Lyman Wilbur, of California, President-elect, emphasised the necessity in medical affairs of decentralisation of organisation, in order that the special needs of each State might be met by those who best knew its problems. Dr. Wilbur also referred to the increasing interest throughout the country in the practice of periodical physical examination; the doctor trained to thinking in terms of disease must, he said, turn his attention to thinking in terms of being well.